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## ORIGINAL LECTURES.

### GULSTONIAN LECTURES.

#### ON MALIGNANT ENDOCARDITIS.

*Delivered at the Royal College of Physicians, London, on  
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#### LECTURE II.

IN considering the *symptoms* of endocarditis, it is important to bear in mind the manifold conditions under which the disease may develop. A limited number of cases may be grouped together as forming a primary, substantive disease; but in the great majority the affection is either an associated pathological state, or is of the nature of a secondary malady arising in the course of some other disease.

In the primary cases, individuals in perfect health may be attacked, or, more frequently, the disease affects those with chronic valvular endocarditis, with perfect or failing compensation. When the affection occurs after an injury, or in the puerperal state, the cardiac condition may be regarded as part of the general sepsis, and is of the same nature as the pyæmic foci and the inflammation of serous membranes. The existence of the endocarditis in these cases appears to have no special influence on the disease.

When the endocarditis supervenes in the course of some particular affection, as rheumatism or pneumonia, it is usually a secondary process, though, indeed, it may be regarded as directly produced by the causes which have excited the original diseases.

The different modes of onset, and the extraordinary diversity of symptoms which may arise, render it very difficult to present a satisfactory clinical picture. The general symptoms are those of a febrile affection of variable intensity, which may be ushered in, like any acute fever, with rigors, pain in the back, vomiting, headache, etc. Arising in the course of some other disease, there may be simply an intensification of the fever, or a change in its features. The pyrexia is constant, but variable in type and intensity, and more likely than any other symptom to lead to misinterpretation. Prostration of strength, delirium, sweating, and other signs of severe constitutional disturbance are usually present.

Cardiac symptoms may be marked from the outset; pain, palpitation, sense of distress, and murmur; in many instances, there has been old valvular disease, but in a considerable number of cases the heart symptoms remain in the background, hidden by the general condition, and giving no indication; or they may be so slight that they are not even detected on special examination.

The embolic processes give a special prominence to local symptoms which may divert attention from the general malady. Thus delirium, coma, or paralysis may arise from implication of the brain or its membranes; pain in the side and local peritonitis from involvement of the spleen; bloody urine and pain in the back from affection of the kidneys; loss of vision from retinal hemorrhages; and suppuration in various organs or gangrene from the distribution of emboli.

So diverse are the features of malignant endocarditis, that a consideration of the symptoms is greatly facilitated by arranging the cases in groups, according as they display special characters. Dr. Kirkes, in 1852, called the attention of the profession to the occurrence of a typhoid-like condition in acute endocarditis, and he subsequently pointed out the fact that inflammation of the valves might lead to pyæmia. The investigations of Charcot and Vulpian,<sup>1</sup> of Virchow,<sup>2</sup> of Jaccoud,<sup>3</sup> and others, gradually led to the recognition of these two great types of the disease. Of late, still further separation has been made of the cases with features closely resembling ague or intermittent, and also of cases in which the cardiac symptoms are most prominent, and I shall call attention to certain cases in which the symptoms are those of an acute affection of the cerebro-spinal system.

And first let me direct your attention for a few moments to those cases in which the endocarditis is merely a part of the septic or pyæmic state, the result of an external wound, a puerperal process, or an acute necrosis. Somewhat over 18 per cent. of the cases I have analyzed were of this nature, the majority of them occurring in connection with puerperal fever, 11 per cent.; the others in association with various wounds and injuries, or acute necrosis of bone. The puerperal cases appear most frequent after abortions, and the first symptoms usually develop within a week or ten days of delivery, beginning with rigors and fever, and running a course not essentially different from ordinary puerperal septicæmia or pyæmia without endocardial complication. Sometimes the onset of the symptoms may be much delayed, and the patient up and about her duties when the attack comes on. Usually, there is local inflammation of uterus or ligaments; membranous—diphtheritic—endometritis, and phlebitis are common. Occasionally there may be no special affection of the generative organs, as in a very severe case reported by Dr. Moxon,<sup>4</sup> in which there was extensive endocarditis of the right heart, and sloughing patches in the lungs. The woman had been delivered within the month, and the uterus appeared in a state normal for the period. The endocardial lesions are not necessarily ulcerative, but may be vegetative, and occasionally suppurative. It is very evident, from the records, that valves with

<sup>1</sup> Gazette Médicale de Paris, 1862.

<sup>2</sup> Gesamte Abhandlungen, 1856.

<sup>3</sup> Nouveau Dictionnaire de Médecine, etc., art. Endocarditis.

<sup>4</sup> Pathological Society's Transactions, xxi.

sclerotic changes are most often affected. The visceral lesions are always suppurative, but do not appear to be more numerous than in cases of puerperal sepsis without endocarditis. The heart-symptoms may be completely masked by the general condition, and the attention may be directed to them only by the occurrence of embolism. In this connection, it may be remarked that malignant endocarditis may attack pregnant women, and run a rapid course leading to abortion. In two cases of this kind, Litten<sup>1</sup> found no differences in the clinical features or anatomical condition, as regards valves and metastases. In other instances, there may be rigors, sweats, and irregular fever, leading to abortion, without the occurrence of any suppurative foci, as in a case reported by Guyot.<sup>2</sup> Dr. Trueman, of Maccan, New Brunswick, has also sent me notes of a case which developed during pregnancy.

The cases of ulcerative endocarditis in traumatic and operative septicæmia are of a similar nature, but do not appear to occur so frequently as in the puerperal condition. Many of the cases occur after very slight injuries, as paring a hangnail or a corn, a sloughing pile, passage of a sound through a stricture. There are usually suppurative infarcts in the lungs; and even with extensive ulcerative changes in the left heart, the pyæmic foci may be all in connection with the venous system and right heart. This was well illustrated in the case of a man, aged 25, who was admitted to the Montreal General Hospital, May 31st, with a wound of the radial artery. Phlebitis followed, and cellulitis of the arm, rigors, septic pneumonia, thrombosis of the femoral vein, and symptoms of pyæmia. At the necropsy, there were numerous foci in lungs, and a suppurating thrombus in femoral vein. The mitral valve presented, on the ventricular face of anterior segment, a patch, the size of a sixpence, swollen and grayish-white in color, and opposite to it on the auricular face was an ulcer big enough to contain a small pea. There was another also on the wall of left auricle. There were no infarcts in the arterial system. In these cases of puerperal and traumatic septicæmia, the right heart is more frequently affected than in any other group of cases. Thus, of the thirty-seven cases of this kind, there were thirteen in which the tricuspid or pulmonary valves were involved.

In the acute necrosis of bone or acute osteo-myelitis, a secondary endocarditis may develop, and in some instances the clinical features may strongly resemble malignant endocarditis, as was well illustrated in the case of a lad, aged 10, who died after an illness of less than a week's duration, characterized by high fever, rigors, sweats, etc. No local trouble was complained of, and at the post-mortem examination there was ulcerative endocarditis of the right side, and a purulent focus in the septum, and it was only after most careful search that the primary trouble was found in a small spot of acute necrosis of the tibia.

These forms do not strictly come within the province of the physician, but they must be taken into account in any description of malignant endocarditis. The source of the poison is very evident in the external

wound; the metritis, etc., and the lesions, are chiefly in the territory of the venous system and right heart.

In the *pyæmic* group, the clinical features are of a decided pyæmic type, and here the source of infection is at the heart, and the metastatic lesions are chiefly in the territory of the arterial system, rendering very applicable the name of *arterial pyæmia* given by Dr. Wilks to this class of cases. We may recognize two types of the pyæmic form: first, the cases in which the symptoms resemble closely those of ordinary pyæmia, with rigors at intervals, sweats, and other signs of septic infection; and, secondly, an important group, in which intermittent pyrexia is a striking feature, occurring in regular paroxysms like ague, with cold, hot, and sweating stages. These forms may develop as primary independent affections, or come on in the course of rheumatic fever, pneumonia, etc. In our Montreal cases, they have not been so marked as the typhoid type. The following case, with illustrative chart, is a fair example of pyæmic symptoms due to endocarditis developing in the course of pneumonia.

M. W., aged 43, well-built man. Admitted under Dr. Ross, February 26, 1880. Served his time in the army; has had syphilis, and has quite recently had syphilitic ulcers; has also been a hard drinker. In October, 1879, he was in hospital with pneumonia, and had severe cerebral symptoms. On February 23d, severe rigor, followed by fever, cough, and pain in the side. On admission, 26th, signs of consolidation at left base. On 28th, was delirious. On the 1st, the crisis seemed to take place; temperature fell to 98°, remained low for three days, and he seemed to be doing very well. At 1 P.M. on the 4th, he had a severe chill, with vomiting, and followed by sweating. On the 5th, was delirious; had another severe chill at 2 P.M., in which the temperature rose to nearly 104°. Had five stools; no indications pointing to heart. On the 6th, morning temperature normal, patient very prostrate, sweats a great deal, and there is low wandering delirium. From the 6th to the 9th, the temperature rose a degree each evening, reaching 105.3°, its highest point. Pulse over 120, and feeble. From this time until the 14th, he gradually sank, remaining unconscious. The lung-symptoms did not extend, but rather improved. The post-mortem examination revealed extensive ulcerative vegetations on aortic valves, purulent meningitis, and resolving pneumonia of left base.

The attack may be ushered in with a single rigor, or more often a series of chills, which from the outset may constitute a marked feature, and, with the sweating, prostration, and diarrhoea, give a septic character to the case. A light jaundice may develop, and still further intensify the resemblance. Sometimes the case may run on for a couple of weeks with marked typhoid symptoms, and then pyæmic features develop—rigors, sweats, etc.

But by far the most remarkable cases of the pyæmic group are those which present a marked intermittent type of pyrexia, simulating a quotidian or tertian ague. They may occur without any signs or indications of heart disease, or the symptoms may develop in individuals the subjects of chronic valvulitis. The cases are not nearly so frequent as those of the typhoid type; but they have been specially studied by Drs. Wilks,

<sup>1</sup> Charité Annalen, iii., Berlin.

<sup>2</sup> Bulletin de Soc. d'Anatomie, 1879.

Bristowe, and Coupland in this country, Lancereaux in France, Leyden and others in Germany. The paroxysms may have the absolutely typical features of intermittent; the chills, hot stage, and sweating succeeding each other with regularity; and in the intervals there may be an entire absence of the fever. The quotidian type is the most common; the tertian has occasionally been described; and in rare instances two paroxysms have recurred within the twenty-four hours. The cases may be much prolonged, even for three or four months. One of the first references I find to cases of this kind is in a foot-note to one of Dr. Ormerod's *Gulstonian Lectures*,<sup>1</sup> in which a case of Dr. Bond, of Cambridge, is narrated—an instance of chronic valvular disease, with intermittent fever and diarrhoea, two paroxysms occurring in the day. The case lasted four months. In a remarkable case (Dr. Ray) described by Dr. Wilks,<sup>2</sup> during a six or seven weeks' illness, rigors recurred with such regularity that a tertian ague was suspected for a time, although the patient was known to be the subject of heart disease. In some instances, the existence of ague previously has rendered the condition much more puzzling. In several of Lancereaux's cases<sup>3</sup> the patients had had intermittent fever a short time before; so also with one of Leyden's cases.<sup>4</sup> But the most extraordinary case of the kind is recorded by Dr. Bristowe.<sup>5</sup> A patient had ague in October, chills once or twice a day; ill for six weeks; and, after an interval of two or three weeks, they recurred in the second week of December, and continued until December 23d. She was well for a few days, and then the attacks recurred after sleeping in a cold bed, and persisted until her admission to hospital on February 12th. For the four weeks previous to entrance, the attacks came every twelve hours regularly. A murmur was noticed; but the history of ague was so clear, and the attacks so characteristic, that a suspicion of malignant endocarditis was at first not entertained. It was only after the failure of quinine and a variation in the character of the paroxysms, that a diagnosis was reached.<sup>6</sup> In Dr. Coupland's<sup>7</sup> cases the intermittent pyrexia was also well marked. In none of our Montreal cases was the aguish type very pronounced, though in one or two cases there were regularly recurring paroxysms of chills, fever, and sweating; but the conditions under which the attacks developed rendered the clinical features more like ordinary pyæmia. The majority of these cases appear to arise independently of other affections, and occur among what I have referred to as the primary class of cases, though, as already mentioned, some develop in chronic valvular disease, and others appear associated in some way with ague.

The *typhoid* type is by far the most common, and the majority of the cases present features which come under this heading. The disease may set in with a

single rigor or a series of chills, most frequently the former, often a period of *malaise* or ill health has preceded the attack, and in very many instances the symptoms develop in the course of some fever. The characters of this form are irregular temperature, early prostration, and involvement of the nervous system, delirium, somnolence and coma, dry tongue, relaxed bowels, sweats, petechial and other rashes, and occasionally parotitis. Perhaps the majority of cases are mistaken for typhoid, as the heart symptoms may never be prominent, or even when sought for not found.

The following cases illustrate the chief features of this form:

Ann O., aged 36, large, well-nourished woman, admitted under Dr. Wilkins, June 5, 1881. She had been a healthy woman. Dr. Blackader saw her on the 2d, when she complained of severe pains in the back, loins, and hips, which were relieved by poultices. Pulse rapid, tongue furred, no diarrhoea. Admitted supposed to be suffering from typhoid fever. No reliable history, family or personal, could be obtained, but she had been out of sorts for four or five days previous to the onset of the attack. On admission, temperature 104°; pulse 110, respiration 52; no eruption; lungs normal; no heart-murmur; no albumen in urine. On the 6th she passed a restless night. Temperature 104°; pulse 120, dicrotic; abdomen distended; two stools. Passed eighteen ounces of urine, slightly bloody, which may have been from the menses, which began to-day. On 7th, morning temperature 103.2°; pulse weak, 120; respiration 54, shallow; loud sonorous *râles* over chest; bowels and bladder emptied involuntarily; stools frequent, high colored; patient cannot be roused. The legs and general surface seem tender, which causes her to cry out when moved. Urine drawn off by catheter contains much blood, fifty per cent. by volume of albumen, and many granular casts. Pupils unequal; head drawn to the right. Some rigidity of muscles of arms, most marked on the left; increasing coma, and death at 3.30 P.M. of the 7th, the sixth day of her serious illness. At necropsy no hypertrophy of heart; mitral valves a trifle thick, with small superficial losses of substance on both curtains. Aortic valves normal; infarcts in spleen. Numerous small hemorrhagic emboli in kidneys and throughout the intestines. Six or eight suppurating infarcts in brain, chiefly near longitudinal fissure and on median surfaces.

This case is a good example of the primary malignant endocarditis occurring in a healthy individual, and running a rapid course, with symptoms of a typhoid character. The diarrhoea was not profuse, though the intestinal lesions were well marked.

In the following instance, occurring in connection with pneumonia, the profuse diarrhoea and severe nervous prostration were very suggestive of typhoid fever.

J. H., aged 40, drayman, a large, well-built man, was admitted, May 13th, with pneumonia. He had been a pretty healthy man, though he had had two previous attacks of inflammation of the lungs. Had been in the habit of taking stimulants. Present illness began on the 11th, with the usual signs of pneumonia, for which he consulted Dr. Blackader. On admission, was delirious, temperature 105°, respiration 60, pulse 110; consolidation of lower two-thirds of right lung, with the usual physical signs of hepatization. On the 6th day,

<sup>1</sup> Medical Gazette, 1851.

<sup>2</sup> British Medical Journal, 1868.

<sup>3</sup> Gazette de Médecine, 1862; Archives Générale, 1873.

<sup>4</sup> Zeitschrift f. klin. Med., Bd. iv., Berlin.

<sup>5</sup> British Medical Journal, 1881.

<sup>6</sup> Dr. Bristowe mentioned to me, in speaking of this case, that he now regarded it as one of ulcerative endocarditis from the outset. The woman had not had ague before, and the place of her residence was not malarious.

<sup>7</sup> Med. Times and Gazette, 1882, vol. i.



the delirium was less marked and the temperature had fallen to 101.5°. On the 9th day, the fever was 103°, and the condition of lung remained about the same. On the 12th day, I saw him with Dr. Molson. The dulness appeared to be diminishing at the right base; I could detect no murmur at either apex or base of heart. The condition of the patient resembled closely other cases of pneumonia in which ulcerative endocarditis had developed, and I suggested the possibility in this instance. Tongue was furred, no abdominal distention; no spots; diarrhoea had come on in the past few days; stools thin, yellowish in color. Patient was dull and heavy, not actively delirious. On the 18th day, temperature rose to 104.5°, and for the next four days kept about that height. On the 20th day, diarrhoea, which had been checked, began again. On 23d day (June 1st), temperature 104.5°, pulse 96, respiration 30. Dulness diminished at right base, still evident in scapular region at lower part; moist *râles* over back of lung; rhonchi, sibilant, and sonorous, heard in front. A single large dose (30 grains) of quinine, at 4 P.M., did not affect the temperature, which at 10 A.M. was 105.5°. On 26th day, much the same, temperature was kept about 104°; two or three loose stools each day, low delirium, restless at night. For the next three days the fever was not quite so high, the diarrhoea ceased, and he became somewhat rational. Still deficient resonance in right lung behind. Respirations kept about 30, and pulse under 100. On the night of June 8th, patient very restless, required constant watching; temperature 105°; pulse more rapid, 130. On the 10th, patient more drowsy, pulse feeble, 140; large moist *râles* heard over both lungs. In the evening he had a rigor; temperature rose to 105°, and death took place on the morning of the 11th, just a month from the onset of the disease. Petechiæ had appeared on the skin during the last few days of his life.

*Necropsy*, five hours after death. Body not emaciated, petechiæ on skin in various regions. In abdomen, patches of dark extravasation noticed upon coils of intestines, both large and small. In thorax, right lung intimately adherent.

*Heart*. Subpericardial ecchymoses. Numerous petechial spots beneath lining membrane of the cavities; some of them are as large as split peas, and on section present a grayish centre, as if they were small infarcts. The mitral segments were natural looking on the ventricular surface, but on separating the edges, large masses of vegetations were seen blocking the orifice. They were attached to the auricular faces, about 2 to 3 millimetres from the edge; that in the anterior segment was about 2 centimetres in extent, and projected 12 millimetres. It was roughened on the surface. The growth on the posterior segment was smaller, irregularly divided into two bulbous portions, the surfaces of which were smooth. The aortic orifice was blocked with a clot; right anterior valve presented an enormous mass of vegetation, which occupied the entire curtain, except the edge, and infiltrated the whole thickness, appearing in the sinus as small nodular masses. Two perforations existed between the outgrowths, each about the size of a crow-quill. The posterior segment presented a flattened vegetation, which encrusted the centre of the valve, and extended to the corpus Arantii. All of these masses had the same appearance; color

grayish-yellow, except where coated with adherent blood-clot; those on anterior mitral segment and on posterior aortic were roughened, and the granular substance exposed; three others presented smooth surfaces, as if covered by a thin membrane. They were soft, on section granular, uniform throughout, and the consistence of pith. Coronary arteries free.

*Lungs*. Right closely bound to chest-wall by old fibrous adhesions. Posterior part of organ heavy, but crepitant, except at upper part of lower lobe, which, with a band about 3 centimetres in breadth, of the lower part of the upper, and part of the middle lobes, were firm, airless, and granular on section. Color liver-red, interspersed with small opaque areas, the plugs in the air-cells undergoing fatty change. Left lung healthy.

*Spleen* weighed 185 grammes, pulp soft. No infarctions.

*Kidneys* of average size; numerous small infarcts, chiefly in cortex; small hemorrhagic areas with gray centres.

*Intestines*. The deeply ecchymotic patches seen externally corresponded with small infarcts situated in the submucosa, and surrounded by a zone of deeply hemorrhagic tissue, above which the gray pale glandular layer could be distinctly seen. The infarct itself was about the size of a split pea, a little elevated, on section deep red or grayish-red, not in any instance purulent, and surrounded by a zone of extravasation from 1 to 3 centimetres in diameter. They were most abundant in the ileum, about twenty in number. Peyer's glands not swollen.

*Liver* pale, swollen, and soft.

*Brain*. Vessels of pia mater full, parts at base normal. Thick, purulent lymph beneath arachnoid, covering central part of fissures of Sylvius on both sides, over both frontal lobes at anterior part, over the left intraparietal fissure, and on upper part of cerebellum, close to great transverse fissure. A good deal of serosity beneath the membranes. No infarcts in substance of brain.

In some instances, the clinical features are mixed; typhoid and pyæmic characters may alternate, as in the following case:

J. B., aged 38, admitted January 7, 1880, has been a healthy man. Ten years ago, had a severe attack of pneumonia. On the night of January 4th, he felt uneasy, and did not rest well; got feverish, and in the morning had pain in the side and cough. No rigor. Symptoms continued, and he came to hospital on 7th. On admission, temperature was 103°, pulse 128, and respirations 40. Signs of pneumonia in right lung, lower three-fourths. Characteristic expectoration. During the first week in hospital, nervous symptoms appeared; he became delirious, and passed urine and feces in bed; tongue dry; and on the 9th and 10th, there was troublesome vomiting. The temperature was irregular, ranging from 100° to 104°; the evening record usually high, but twice it was lower than the morning. Pulse 120 to 148; respirations 32 to 50. During the second week, the intensity of the symptoms abated; the temperature kept lower, not once reaching 101°. The nervous prostration continued, with tremor of whole body, and the discharges were passed involuntarily. Tongue very dry. A very disgusting fetor emanated from the body. He lay like a patient in the third week



of severe typhoid fever; took food and stimulants well. On the 19th, a painful swelling appeared in left parotid region, and he began to have chills, and sweated a great deal each day. No objective indications of heart trouble. The lung cleared very much in the third week, but the prostration continued. During the fourth week, the swelling of the parotid increased, and on February 1st an abscess was opened in this region. On 30th, there were severe chills, with blueness of face and fingertips. Much sweating, of a profuse drenching character. Became brighter after the abscess was opened, and the nervous symptoms were less marked. Temperature ranged from 98° to 103°, rising with the chills. In the fifth week, he remained in this state, with but little change, occasional chills and profuse sweats, the picture being more like severe pyæmia. In the sixth week, the prostration increased, and he lay in a heavy unconscious state. No chills, but most profuse sweats. On February 13th and 14th, the temperature rose very high, reaching 105°, and death took place on the 15th, after an illness of forty-two days.

The necropsy revealed extensive mitral endocarditis, as the only special lesion. The base of the right lung was a little firmer than the left, but not granular on section. Only one infarct found, which was in upper part of spleen. Intestines healthy; no meningitis. The parotid abscess had almost healed.

*Cardiac Group.*—Under this heading may be arranged, as suggested by Dr. Bramwell,<sup>1</sup> those cases in which patients, the subjects of chronic valve-disease, are attacked with febrile symptoms and evidences of a recent endocarditis engrafted upon the old process. I have already remarked on the great frequency with which ulcerative changes are found in connection with sclerotic endocarditis. Many of such cases present features of the pyæmic, typhoid, or cerebral types, and may be of the most acute character; but, in others, the process appears much less intense, and the course more chronic. In a considerable series of cases, the history is somewhat as follows: The patient has, say, aortic valve-disease, and is under treatment for failing compensation, when he begins to have slight irregular fever, an evening exacerbation of two or three degrees, some increase in cardiac pain, and a sense of restlessness and distress. Embolic phenomena may develop; a sudden hemiplegia; pain in region of spleen, and signs of enlargement of the organ; or there is pain in the back, with bloody urine. In other instances, peripheral embolism may take place, with gangrene of foot or hand. There may be hebetude or a low delirium. Instances such as these are extremely common; and while, in some, the process may be very intense, in others it is essentially chronic, and may last for weeks or months, so that the term malignant seems not at all applicable to them; still, in a large series of cases, all gradations can be seen between the most severe and the milder forms. Dr. Green<sup>2</sup> referred to a case which lasted six months, and to another in which, during eighteen months, there were attacks of irregular fever. I have known the febrile symptoms subside for weeks, to recur again with increased severity; and there are cases which render it probable that the process may subside entirely. The

ulcerative destruction, in these cases, may be most extensive; and I have seen the aortic ring with scarcely a trace of valve-substance left. The process in the chronic cases is also mycotic, and it is to be carefully distinguished from the atheromatous changes. In very many instances, there is no history of rheumatic fever or other constitutional disorder; but the endocarditis appears to attack the sclerotic valves as a primary process, and a very considerable number of the most typical cases are of this kind. A good example was the following case, in which the disease attacked deformed and hardened valves, and the clinical symptoms were prolonged for nearly three months: H. M., aged 38, admitted September 8th, under Dr. Ross. Good family and personal history; has always enjoyed excellent health. A month ago had chilly feelings, fever, and sweating, with vomiting. Kept about until ten days before admission, when he took to bed, with pains at heart, and fever. On admission, marked aortic incompetency; temperature 100°; seemed dull and heavy. On 15th, there was iliac tenderness, and some diarrhoea. For the next two weeks, remained in same state, temperature rising at times to 103°. During the first week of October, the prostration increased, and there was slight delirium at night; temperature not higher than 102°. On the 14th, there was an eruption of petechiæ. From this time the temperature kept lower—100° to 101°—the delirium and prostration increased, and death took place on the 23d. Two of the aortic cusps had fused, and there were old sclerotic changes; there were recent soft grayish vegetations; spleen presented six or eight infarcts, one suppurative. These are the cases of ulcerative endocarditis which present fewest difficulties in diagnosis. The existence of the chronic heart disease excites attention; and even if compensation has previously been perfect, the ulcerative process may be the very cause of disturbing the balance and producing marked symptoms. In my experience, the existence of fever is invariable when the ulcerative processes are due to micrococci, whereas most extensive destructive changes may occur in atheromatous disease without any elevation of temperature. It may be possible that the granular detritus discharged from atheromatous foci on the valves, or on the aorta, may have irritating properties, yet, in two instances, I have met with most extensive atheromatous ulcers on valves and aorta, from which large quantities of material must have been discharged, and the patients were not febrile. Dr. Sansom,<sup>1</sup> however, has referred to a case of ulcerative endocarditis in which there was no elevation of temperature throughout.

*The Cerebral Group.*—A considerable number of cases of malignant endocarditis come under observation, in hospital practice, perhaps, for the first time, with symptoms of cerebral, or even cerebro-spinal, trouble. In three of the Montreal cases, the patients were brought to hospital unconscious, and presented the appearance of profound cerebral affection. One of the first cases I saw was of this kind. The patient, a woman, aged 29, was admitted on October 22d in an unconscious state, and no history could be obtained. On the 24th, she became partially conscious, and complained of great pain in the head and back of the neck. Symptoms of

<sup>1</sup> Diseases of the Heart, Edinburgh, 1884.

<sup>2</sup> Lancet, 1884, vol. i.

<sup>1</sup> The Lancet, 1884, vol. i.

slight apex-pneumonia were detected. Temperature up to 104°. On the 25th, she passed urine and feces involuntarily. There was strabismus of right eye, and commencing ulceration of left cornea. Death took place on the 26th. The symptoms were those of an acute meningitis. The post-mortem examination revealed apex-pneumonia, a patch of endocarditis on mitral, and suppurative meningitis, involving chiefly the cortex. Another case, almost the counterpart, was admitted last year, under Dr. Molson, in an unconscious state, and died eighteen hours after admission, when the necropsy revealed apex-pneumonia, extensive endocarditis, and suppurative meningitis. There may be early unconsciousness or delirium without any meningeal implication, as in a case of primary endocarditis admitted June 5, 1881. The patient may be wildly delirious or unconscious at the first visit of the medical man, as in a case narrated by Eberth.<sup>1</sup> Very many of these cases die within two or three days of admission, and the question of diagnosis has usually to be suspended; indeed, in looking over the records of eleven instances in which these cerebral symptoms were early, they appear to run a more rapid course than other cases.

In two remarkable cases, there was cerebro-spinal meningitis. Homolle<sup>2</sup> records a case of a lad who was admitted with symptoms at first like those of typhoid, and then of a marked cerebro-spinal character. There was also a pulmonary affection and endocarditis. Patient lived five days. At the necropsy, there was suppurative meningitis of brain and cord, pneumonia of one lung, and extensive ulcerative endocarditis, with old sclerotic changes.

A still more remarkable case is reported by Heine-man.<sup>3</sup> Boy, aged 14, admitted November 19th. For two days previous he had suffered with pains in back and legs, chills, fever, loss of appetite, vomiting, and constipation; was rational on admission; tongue coated; temperature 105.2°; condition of heart and lungs negative.

November 20th: Temperature, morning, 103.4°; evening, 105.6°. Feces and urine passed involuntarily.

November 21st: A purpuric eruption noticed on the chest, then on the face, and afterwards on legs and arms. Temperature 104.8°; pulse very feeble; delirium; hyperæsthesia along the spine; no opisthotonos; pericarditis suspected. At 11 P.M. of this day, a second crop of purpuric spots came out; temperature 106°; convulsive movements. 22d, 3 A.M., second convulsive seizure, and death. At necropsy, there was purulent exudation on brain, and the meninges of cord were congested, opaque, and inflamed. Congestion of lower lobe of lungs. Recent vegetations on mitral, and near apex on anterior wall of left ventricle, a small cavity, indicative of probable abscess and destruction of tissue. Purulent serum in pericardium; kidneys presented embolic abscesses.

Certain clinical features may be specially referred to in a few words. The fever, as will have been gathered from the previous statements, is of a very variable character. Irregularity is the prominent feature; periods of low may alternate with periods of high temperature,

or a remittent may become an intermittent. A remittent type is most frequently met with, but the remissions do not occur with any regularity. Occasionally there may be a continuous high fever, the thermometer not registering below 103° for a week at a time. The pyæmic and aguish types have been sufficiently noted.

The occurrence of a rash has been described by many observers, and, in some instances, has led to errors of diagnosis. The most common form is the hemorrhagic, in the form of small petechiæ, distributed over the trunk, particularly the abdomen, less often in the face and extremities. They may be most abundant over the whole body, and at times are large and present small white centres. When severe nervous symptoms are also present, the resemblance of the cases to cerebro-spinal meningitis, or typhus, may be very close. In one instance, the case was thought to be hemorrhagic variola (Duget and Hayem<sup>4</sup>). An erythematous rash has also been observed.

In a case of Dr. Cayley's,<sup>5</sup> there was a mottled red rash on the skin. Colson<sup>6</sup> describes a case in which the rash was erythematous, and in spots distinctly papular.

The mental symptoms may be of a very varied character. By far the most frequent conditions are low delirium, and dull, semi-conscious, apathetic state. There may be at the outset active delirium, or even maniacal outbursts. In a case of Dr. Habershon's,<sup>4</sup> there was a condition described as mental eccentricity. When there is extensive meningitis, there is usually a condition of deep coma.

Sweating is a very frequent symptom, and is worthy of special notice, from the peculiarly drenching character, which is, as Dr. Henry Thompson remarks,<sup>5</sup> second only to that of ague, and usually far beyond the average mark of phthisis or pyæmia.

The diarrhœa is not necessarily dependent on any recognizable lesion, and may not be very marked, even when the infarcts on the mucosa are most abundant. As noted in several of the cases, it may be profuse, and still further add to the resemblance which some of the cases bear to typhoid fever.

Jaundice may be present, but appears to be a rare symptom. Cases, some of which were mistaken for acute yellow atrophy, are reported by Schnitzler,<sup>6</sup> Gubler,<sup>7</sup> Luys,<sup>8</sup> and Mattice and Chalvet.<sup>9</sup>

The heart symptoms may early attract attention, from the complaints of pain and palpitation; but, as a rule, they are latent, and unless sought for are likely to be overlooked. In those cases with chronic valve disease, there is usually no difficulty, but where the affection sets in with marked constitutional symptoms, the local trouble is very apt not to attract attention. Even with extensive vegetations there may be no murmur present, or it may be variable. There are many instances on record, by careful observers, in which the examination of the heart was negative.

<sup>1</sup> C. R., Soc. de Biologie, 1865.

<sup>2</sup> Bull. de Soc. d'Anatomie, 1876.

<sup>3</sup> Guy's Hospital Reports, vol. xvii.

<sup>4</sup> Lancet, 1880.

<sup>5</sup> Wiener med. Presse, 1865.

<sup>6</sup> Gazette Médicale, 1862.

<sup>7</sup> Ibid., 1864.

<sup>8</sup> The Lancet, 1881, i.

<sup>9</sup> Ibid., 1862.

<sup>1</sup> Virchow's Archiv, lvii.

<sup>2</sup> Bulletin de Soc. d'Anatomie, 1873.

<sup>3</sup> New York Medical Record, ii., 1881.

The *course* of the disease presents many variations, well illustrated by the records I have given; very acute cases may run their course within the week, as in the patient Ann O., already referred to, while in others the duration may be even two or three months. Except in certain cases in which the disease attacks patients the subjects of chronic valvulitis, the course is rarely prolonged beyond four or five weeks. Some cases of the pyæmic group, particularly those with intermittent pyrexia, appear very prolonged, even two or three months. The most rapidly fatal case is described by Eberth,<sup>1</sup> in which a man, who had enjoyed previous good health, was attacked on the evening of the 25th, with rigors, followed by high fever and rapid unconsciousness. The temperature that night, when seen by a physician, was 41° C., and the case seemed like one of typhus with meningitis. On the 27th, he was removed to the hospital, where he died at 5 P.M. Temperature was 42.4° C. There were extensive ulcers in the aortic valves, and suppurative infarcts in the brain. The duration in this case was scarcely two days. In a considerable number of instances, the disease terminates within a week or ten days.

## ORIGINAL ARTICLES.

### DISINFECTANTS.

PRELIMINARY REPORTS OF THE COMMITTEE ON DISINFECTANTS OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

#### VII.

### SULPHUR DIOXIDE.

BY GEORGE M. STERNBERG, M.D.,  
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VALLIN, to whom we are indebted for the best practical "treatise upon disinfectants and disinfection" which has yet been published, says: "Sulphurous acid, obtained by the combustion of sulphur in free air, occupies almost the first place among the veritable disinfectants." (*Op. cit.*, p. 243.)

This is the deliberate judgment of one who had carefully considered the experimental evidence accessible at the time this opinion was formulated (1882).

The use of sulphurous acid gas as a disinfecting agent has come down to us from remote antiquity, and it is safe to say that no gaseous disinfectant known is more extensively used, or has a higher place in the confidence of leading sanitary authorities at the present day. So well established is the belief that the fumes of burning sulphur will destroy the infection of smallpox, scarlet fever, yellow fever, etc., that it is probable that many believers in the germ theory of disease would be disposed to abandon this belief rather than to give up their faith in the disinfecting power of sulphurous acid gas, in case the experimental evidence relating to the germicide power of this agent should be in conflict with the results of their experience.

It is the object of the present paper to present the experimental evidence for the consideration of sanitarians, and, as the subject is one of great practical importance, the paper will necessarily be one of considerable length.

Before the modern methods of isolating and cultivating pathogenic microorganisms had been perfected, various efforts had been made to determine by experiment the disinfecting power of sulphurous acid gas. One of the first of these experiments upon record is that which the Russian physicians are said to have made at the time of the pest in Moscow, in 1771. According to Dr. A. Wolff, ten cloaks (*pelisses*) which had been worn by soldiers seized with the plague, during their sickness, were exposed to fumigation (*une forte fumigation*) with sulphur and salt-petre. Ten criminals, condemned to death, were then required to wear these garments, and not one of them contracted the malady. In the absence of any control-experiment in which similar garments not disinfected were proved to communicate the disease, we cannot admit that disinfection was accomplished in this instance, as claimed by the Russian physicians, by the fumigation resorted to. The same criticism may be made with reference to most of the evidence relied upon at the present day, which is supposed to establish the value of the agent in question. It is negative in character, and we have no control-experiments. Moreover, accompanying or following the fumigation, other measures are commonly adopted, such as free ventilation and cleansing of apartments, exposure of clothing and bedding to an abundance of fresh air, etc. As in clinical experiments a fictitious value is often assigned to remedies by reason of the failure of the experimenter to recognize the influence of the *vis medicatrix nature*, so there is reason to believe a "disinfectant" may often establish a temporary reputation, at least, upon the real virtues of an abundance of fresh air, together with a free use of hot water and scrubbing brushes, with perhaps a judicious use of the whitewash brush in addition. These remarks are made not to throw discredit in advance upon the agent under consideration, but with a view to showing that a careful survey of the experimental evidence is necessary, and that a spirit of scientific conservatism is required when the attempt is made to estimate the value of negative evidence in a case of this kind.

In vaccine virus we have an infectious material which seems especially well adapted as a test of disinfecting power, and the inference seems justified that an agent which will destroy the specific virulence of this material may also be relied upon for the destruction of the smallpox infection. The writer applied this test in a series of experiments made in 1880 and 1881, and published in the *Bulletin* of the National Board of Health. The results obtained have been summarized by Vallin, and, as his work is before me, I quote from it as follows:

"Dougall and Baxter have shown the neutralizing power of sulphurous acid upon different kinds of inoculable virus. Both exposed for ten minutes, in an atmosphere saturated with sulphurous fumes, ivory points charged with dry vaccine virus. At the end of this time the neutralized virus was inoculated by three punctures

<sup>1</sup> Virchow's Archiv, lvii.

<sup>2</sup> E. Vallin, Médecin Principal de 1re Classe de l'Armée, Professeur d'Hygiène à l'école de Méd. Militaire du Val-de-Grace, etc. *Traité des Désinfectants et de la Désinfection*, Paris, 1882.



in the arm of a non-vaccinated infant; while in the other arm, at the same time, three punctures were made with ivory points charged with the same virus, but not exposed to sulphurous acid. The last-mentioned punctures were all followed by perfectly developed vesicles, the punctures upon the other arm gave no result. Unfortunately the quantity of the acid, or of sulphur burned, is not mentioned; this time, by exception, Baxter leaves us in doubt.

"Dr. Sternberg, surgeon in the United States Army, has taken up these experiments in an ingenious manner and with greater precision. This author burned a determined quantity of sulphur in a wooden box having a capacity of ten litres. He submitted to the vapors thus produced liquid vaccine virus, placed in a watch-glass, for a period of twelve hours. The following day unvaccinated infants were inoculated in one arm with the disinfected virus, and in the other with a portion of the same virus not exposed to the disinfectant.

"Liquid virus thus exposed for twelve hours to the action of the fumes from 3 centigrammes of sulphur burned in the air-chamber—that is, 24 cubic centimetres of gas to 10 litres of air, or a little more than two parts in a thousand—produced but a single vesicle, while the non-disinfected virus in the other arm gave a successful result in every instance. Upon doubling the amount of sulphur—that is, 6 centigrammes to 10 litres, or 6 grammes per cubic metre, or 5 volumes of sulphurous acid to 1000 volumes of air—and reducing the time of exposure to four hours, the vaccine still remained inactive after exposure.

"It suffices, then, to burn 5 grammes of sulphur in a cubic metre of air, in order to neutralize liquid vaccine, but this vaccine coagulates almost immediately upon contact with sulphurous acid gas; and this contributes, perhaps, to destroy, or to modify, its inoculability. We shall see, further on, that experiment made in spaces of such small dimensions may lead to grave errors.

"In order to disinfect dry vaccine, Sternberg found that a considerably larger quantity of sulphur was required, viz., 16 grammes per cubic metre, which corresponds with the classical proportion of one volume of sulphurous acid gas to 100 volumes of air; in this regard the experiments of Sternberg confirm those which have been obtained by many other authors."

Baxter has also tested the power of an aqueous solution of sulphur dioxide to disinfect the virus of glanders, and of an infectious form of septicæmia—induced—in guinea-pigs. Four parts of  $\text{SO}_2$  by weight, added to 1000 parts of the diluted virus of glanders, neutralized its infective properties, as determined by inoculation experiments. The septic virus was destroyed by 3 parts by weight in 100, while 6 in 1000 failed. The time of exposure to the disinfectant in these experiments is said to have been from thirty minutes to three hours; but this is considered by Baxter to be a matter of secondary importance, and, according to him, disinfection is complete at the end of five minutes, when the virus has been intimately mixed with the disinfecting solution.

The wide limits (3:100 and 6:1000) between success and failure in these experiments of Baxter, and an evident want of precision in the conditions, especially as to time, induced Vallin, from whom we have quoted the above results, to undertake additional experiments with the virus of glanders. He says:

"I had, in January, 1881, an opportunity to repeat these experiments. A patient in the service of our colleague, M. Gaujat, at Val de Grace, was attacked with glanders—*abcès farcineux multiples*—and furnished an

inoculable pus, with which Dr. Kiener produced in several animals, guinea-pigs, cats, etc., the characteristic lesions of glanders. A small quantity of this pus, obtained directly from the patient, and placed in a watch-glass, was exposed for twelve hours in a wooden box having a capacity of exactly 100 litres. Two grammes of sulphur were burned in this box, an amount which corresponds with 20 grammes per cubic metre. The following day a guinea-pig was inoculated with the disinfected virus. At the end of three months this animal remained in perfect health. Another guinea-pig, inoculated the same day with a second portion of the same virus preserved between two watch-glasses, and not disinfected, died at the end of two months with the characteristic lesions of glanders."

Additional experiments were made with the same virulent pus dried in the open air upon little squares of flannel. Inoculation with this material failed after exposure to sulphur dioxide generated by burning sulphur in the proportion of 15 grammes per cubic metre. But inoculation with the desiccated virus not exposed to a disinfecting agent also failed, and Vallin remarks that desiccation alone had perhaps sufficed to destroy the virus, as in the experiments of Galtier. Experiments were also made with pus obtained from a tuberculous abscess in a case of Pott's disease. This material was divided into two portions and placed in watch-glasses. One portion was subjected for twelve hours to the action of sulphur dioxide generated by burning sulphur in the proportion of 20 grammes per cubic metre. This pus, injected subcutaneously into a guinea-pig, produced no result. At the end of four months the animal remained in good health. The non-disinfected pus injected into another guinea-pig caused its death on the forty-eighth day. Its liver, spleen, lungs, and peritoneum, were filled with tubercle granules. Other experiments were made with pus obtained from two chancres "of doubtful nature." Inoculation with this material, after exposure to  $\text{SO}_2$  (15 grammes of sulphur per cubic metre of space), gave no result, while the non-disinfected pus produced "characteristic pustules."

In the experiments thus far recorded the disinfecting power of the agent under consideration is fully established for certain kinds of material, and especially for vaccine virus. In my own experiments upon this material the results were extremely definite, and the conditions observed were such as to render them unimpeachable. Experiments upon original virus from various sources are especially valuable from a practical point of view, inasmuch as the results obtained are evidently reliable guides with reference to the destruction of infective virulence in the several kinds of material experimented upon, and this without regard to any theory as to the nature of the morbid agent. We know, however, that in several infectious diseases, at least, this agent is a living organism or germ. It is, therefore, a matter of importance to determine the exact germicide power of this and other agents which have been proved to be useful disinfectants, and numerous experiments have been made with this object in view. If the germ theory of disease is correct, as applied to all infectious diseases, there should be a correspondence between the results obtained in experiments with original virus and those made upon pure cultures of the

pathogenic organism to which such virus owes its infecting power. This is an interesting question in connection with the agent under consideration, inasmuch as Wernitz has shown that sulphurous acid promptly neutralizes the action of non-living ferments in comparatively small amounts, and there is therefore ground for the supposition that the specific disease poisons destroyed by this agent in the disinfection experiments above recorded were of this nature.

According to Wernitz,<sup>1</sup> the action of pepsine, of ptyaline, of invertine, and of diastase, is prevented by the presence of an aqueous solution of  $\text{SO}_2$  of 1:1317 to 1:8600 (by weight); while the action of myrosine and of emulsine is neutralized by 1:21,000.

Wernich, of Breslau, experimenting in the Pathological Institute of Berlin, 1877, saturated strips of woollen or cotton goods with putrid liquids, and exposed them under a bell-jar containing a definite proportion of sulphurous acid gas. Then, with proper precautions, these strips were introduced into tubes containing Pasteur's culture solution, thoroughly sterilized. The development of bacteria in this fluid was taken as evidence that disinfection was not complete. The results obtained are summarized by Vallin<sup>2</sup> as follows:

When the strips of material were suspended for several hours under a bell-jar containing 3.3 volumes of sulphurous acid per 100 volumes of air, they were not disinfected. When the proportion of gas was increased to 7 per cent., or even to 4 per cent., the time of exposure being six hours, the strips of goods no longer fertilized culture liquids.

Schotte and Gärtner,<sup>3</sup> in 1880, experimented also upon the bacteria of putrefaction. In a chamber having a capacity of 40 cubic metres they placed, at various levels, shallow dishes containing culture liquids, into which putrefactive bacteria were introduced. Sulphur was burned in earthen vessels, placed about four feet above the level of the floor. When the amount burned was in the proportion of 15 grammes per cubic metre of space—an amount which gives one volume of  $\text{SO}_2$  to 100 volumes of air—it was found that, at the end of six hours, the gas had escaped to such an extent that it was possible to enter and remain in the room, although during the entire time the doors and windows had been carefully closed. The result of the experiment was that the culture liquids exposed in the upper part of the chamber remained clear, while those placed upon the floor broke down at the end of twenty-four to thirty-six hours. When the amount of sulphur burned was increased to 28 grammes per cubic metre (about two volumes per cent. of  $\text{SO}_2$ ), disinfection was complete. When the culture fluids were placed upon the shelves of a cupboard, "half-closed," and situated in the corner of the chamber, disinfection was only obtained by burning 92 grammes of sulphur per cubic metre of space.

We remark that the test of disinfection was not satisfactory in these experiments. A certain amount of  $\text{SO}_2$  was, no doubt, absorbed by the exposed culture liquids, and these, in successful experiments, failed to break down, because of the antiseptic or restraining influence of this agent. But, to prove that the germs of putrefaction in these culture liquids were killed, it would have been necessary to inoculate fresh cultures with a small amount of this material which had been exposed to the action of a disinfectant.

Other experiments were made by the authors named, which we shall quote in the language of Vallin:<sup>1</sup>

"Strips of very thick woollen goods were soaked in culture liquids containing bacteria. These were dried, a proceeding which did not destroy the vitality of the bacteria, as proved by culture experiments. These strips were suspended from a cord stretched across the middle of the chamber at a level of about five feet above the floor. Half of the strips were left dry; the other half, after having been dried, were again moistened, so that they might be exposed in a moist condition to the sulphurous vapors. Our authors arrived at the following unexpected results: Even after having been exposed to the action of sulphur dioxide, produced by the combustion of 92 grammes of sulphur per cubic metre, the moistened strips caused culture liquids, in which they were placed, to break down at the end of three or four days. The dry strips exposed in the same way produced the same result somewhat sooner—*des le 3e jour*. Gärtner and Schotte have concluded from this that the germs, or protorganisms, hidden in the deeper portions of the very thick woollen goods, resist strong fumigations with sulphurous acid gas, or, with other disinfectants. They arrive almost to the point of doubting the possibility of a certain and absolute disinfection, at least by the gases or vapors."

The limits of this paper admit only of a brief abstract of the elaborate experimental researches relating to the value of sulphur dioxide as a disinfectant, made by Koch<sup>4</sup> and by Wolffhügel,<sup>5</sup> under the auspices of the Imperial Board of Health of Germany, and published in the first volume of the *Mittheilungen aus dem Kaiserlichen Gesundheitsamte*.

The experiments of Wolffhügel relate to questions concerning the practical use of  $\text{SO}_2$ , the best methods of producing it, etc., while those of Koch are designed to fix its exact germicide value. In Koch's first experiments sulphur dioxide was generated by burning sulphur in a box having a capacity of 290 litres. Other experiments were made in a closed chamber. The amount of  $\text{SO}_2$  present was estimated at the outset and at various intervals. Thus in his third experiment, in which the disinfection box was used, the amount of  $\text{SO}_2$  was:

At first,	6.13 vol. per cent.
At the end of 24 hours,	4.88 " " "
At the end of 72 hours,	4.47 " " "
At the end of 96 hours,	3.3 " " "

In this experiment only spore-containing material was exposed in the disinfection box. This consisted of old dried miltzbrand (anthrax) blood, anthrax spores dried upon silk threads, spore-containing earth, and hay bacillus spores dried upon blotting

<sup>1</sup> I. Wernitz, Ueber die Wirkung der antiseptica auf ungeformte Fermente, Dorpat, 1880.

<sup>2</sup> Op. cit., p. 254.

<sup>3</sup> Viertel. f. Oeff. Gesund., 1880, t. xii. pp. 337-376.

<sup>4</sup> Op. cit., p. 253.

<sup>5</sup> Ibid., pp. 188-233.

<sup>2</sup> Op. cit., pp. 252-261.

paper. The result was entirely negative, the developing power of the spores was not in any instance destroyed, even after ninety-six hours' exposure, and a mouse inoculated with the dried blood, exposed for this length of time, died promptly of anthrax.

The results obtained with material not containing spores, were more satisfactory; but still not of a nature to give confidence in this agent as a reliable disinfectant for the purposes and in the manner in which it is commonly applied. The experiments show, in the first place, that it is not safe to apply the data obtained by burning sulphur under a bell-jar, or in a tight box of small dimensions, to disinfection on a large scale, owing, principally, to the rapid loss of the gas which occurs in an ordinary apartment, with all apertures carefully closed. Thus in Koch's fifth experiment in a closed chamber, the rapid loss of  $\text{SO}_2$  is shown by the following figures:

At the end of half an hour,	3.12	vol.	per cent.
At the end of 2 hours,	1.25	"	"
At the end of 22 hours,	0.015	"	"

In Experiment No. 2, made in a box having a capacity of 290 litres, anthrax bacilli, without spores, from the spleen of a mouse recently dead, and dried upon silk thread, were destroyed by exposure for thirty minutes to  $\text{SO}_2$  in the proportion of 1 vol. per cent.

In Experiment No. 7, also made in the box, the amount of  $\text{SO}_2$  at the outset was 0.84; at the end of twenty-four hours, 0.55. An exposure of one hour in this experiment destroyed anthrax bacilli (still moist) upon silk thread. Four hours' exposure failed to destroy the vitality of *Micrococcus prodigiosus* growing upon potato, but twenty-four hours' exposure was successful. The same result was obtained with the bacteria of blue pus.

In Experiment No. 8, it was found that an aqueous solution of  $\text{SO}_2$  of 11.436 per cent., by weight, did not destroy anthrax spores in twenty-four hours, but was successful in forty-eight hours. When the proportion of  $\text{SO}_2$  was reduced to 5.718 per cent. disinfection was only accomplished after five days' immersion in the aqueous solution.

According to Arloing, Cornevin, and Thomas, sulphurous acid does not destroy the bacteria of symptomatic anthrax, which contain spores.

The Experimental results thus far recorded will perhaps prepare those who have heretofore had implicit faith in the disinfecting power of sulphurous acid, to accept without too much incredulity the following results obtained by the writer in recent experiments with this agent.

At the request of Dr. Wm. M. Smith, Health Officer of the Port of New York, I visited that city on the 9th of last January, for the purpose of applying biological tests in an experiment designed to ascertain whether it is practicable to disinfect rags in the bale. A manufacturing chemist of New York proposed to accomplish this by injecting sulphur dioxide into the interior of the bales through hollow tubes. The  $\text{SO}_2$  had been compressed to the liquid form in copper cylinders, and being under a pressure of six atmospheres was expected to permeate the bale thoroughly when the valve was opened leading

to the hollow and perforated screws introduced into it. The bale was to be placed in a closed chest of moderate dimensions, and disinfection was to be accomplished within a few minutes.

The experiment was made at the Baltic Stores, Brooklyn, in the presence of Dr. Smith, Health Officer of New York, Dr. Raymond, Commissioner of Health of the City of Brooklyn, and several other gentlemen belonging to the Health Department of New York and of Massachusetts.

The following material, which I had brought in sterilized tubes from the biological laboratory of Johns Hopkins University, Baltimore, was introduced into the bale through openings made with a pocket-knife. The depth of these openings was from two to four inches. The material to be disinfected was upon pledgets of cotton previously sterilized, which had been saturated with pure cultures of the various test-organisms. Some of these pledgets had been subsequently dried at a low temperature, others remained moist. The apertures in the bale were closed, after introducing these bits of cotton, by tamping in strips of old muslin. When these preparations had been made the bale of rags was placed in the disinfection chamber and the gas turned on. The time during which the gas was allowed to flow was three minutes and a half. The pressure, as shown by a gauge in connection with the copper cylinder, was eighty pounds at the commencement and seventy-five at the close of the experiment. The disinfection chamber was not tight, and all those in the vicinity were obliged to retire to a respectful distance to windward while the gas was flowing and for a considerable time afterward, owing to the abundant escape and stifling effect of the  $\text{SO}_2$ . It was only after an interval of twenty or thirty minutes that the disinfection chamber could be approached to withdraw the bale, and after it had remained in the open air for some time, I was almost suffocated while removing the pledgets of cotton containing the test organisms. These were at once placed, with sterilized forceps, in sterilized glass tubes, and each tube was at once plugged with sterilized cotton. In this way they were taken back to the laboratory in Baltimore, where the test of disinfection was completed by culture and inoculation experiments. The nature of the material and the result of the experiment are given in the accompanying table:

Other pledgets of cotton had been exposed in the bale, which had been saturated with tuberculous sputum, but this part of the experiment was not followed up, owing to the scarcity of rabbits for inoculation.

Soon after my return to Baltimore, I received from the manufacturer in New York, a copper cylinder, containing a liberal supply of  $\text{SO}_2$  in liquid form. With this the following experiment was made, January 25, in a closet having a capacity of eight cubic yards. This closet, in the basement of the biological laboratory, had been constructed under the stairway as a refrigerating chamber. The walls were double and filled in with asbestos, and the door, made in the same way, was fitted to close as accurately as possible, and held closed by a strong clamp.



Number of tube containing cotton pledget.	Nature of material.	Test by cultivation.	Result.	Test by inoculation.	Result.
No. 1.	<i>Bacillus anthracis</i> containing spores (dry).	One culture tube.	Abundant development of anthrax filaments in twenty-four hours.	One rabbit inoculated subcutaneously.	Died of anthrax on third day.
No. 2.	<i>Bacillus anthracis</i> containing spores (dry).	One culture tube.	Abundant development of anthrax filaments in twenty-four hours.	One rabbit inoculated subcutaneously.	Died of anthrax on third day.
No. 3.	<i>Bacillus anthracis</i> containing spores (moist).	Two culture tubes.	Abundant development in both.	One rabbit inoculated.	Survived the inoculation.
No. 4.	<i>Bacillus subtilis</i> spores (dry).	Two culture tubes.	Abundant development of <i>Bacillus subtilis</i> in both.		
No. 5.	<i>Bacillus subtilis</i> spores (moist).	Three culture tubes.	Abundant development of <i>Bacillus subtilis</i> in each.		

A sufficient quantity of the liquid  $\text{SO}_2$  to produce ten volumes per cent., when volatilized in the closet described, was drawn from the copper cylinder into a large beaker, quickly placed upon the floor of the disinfection chamber, and the door closed. At the end of twelve hours the door was thrown open and the gas permitted to escape. The test-organisms were exposed upon little pledgets of absorbent cotton, which had been saturated with culture-fluids, containing the various microorganisms employed. Some of these pledgets of cotton had been dried at a low temperature in advance of the experiment, and others were exposed moist.

Some of the prepared bits of absorbent cotton were placed in glass tubes, open at one end and sealed at the other. Other pledgets were loosely folded in a single thickness of heavy muslin which had been sterilized by heat. The ends of these little packages were left open, so that the  $\text{SO}_2$  might have free access to the interior. These packages properly labelled, were placed in the inside pockets of a coat, and this was suspended in the closed chamber used for the experiment. The glass tubes were placed in an open pasteboard box upon the floor of the disinfection chamber. Other pledgets of cotton, similarly prepared, were wrapped up in little bundles of cotton, weighing half an ounce each, and enveloped in a single layer of sterilized muslin. Still other pledgets were wrapped up in a woollen blanket, in such manner that they were in the centre of a compact bundle, eighteen inches long, and ten inches in diameter. The result as determined by cultivation experiments, was as follows:

*Cotton pledgets exposed in glass tubes.*

*Micrococci* from case of vaccinal erysipelas, moist, and dry. No development from the moist material, abundant development of micrococci from dry material.

*Bacillus subtilis* (spores), moist and dry. Abundant development of *B. subtilis* at end of twenty-four hours from both moist and dry material.

*Bacillus anthracis* (spores), dry. Abundant development of anthrax bacilli within twenty-four hours.

*Cotton pledgets placed in coat pocket.*

*Micrococci* from case of vaccinal erysipelas, moist and dry. Two culture-tubes inoculated from each.

Abundant development of same micrococci within twenty-four hours.

*Bacillus anthracis* (spores), moist and dry. Two tubes inoculated from each. Pure cultures of *B. anthracis* obtained in each within twenty-four hours.

*Bacillus subtilis* (spores), moist and dry. Two tubes inoculated from each. At the end of twenty-four hours a mycoderma of *B. subtilis* was found upon the surface of the culture liquid in each of these tubes.

The complete failure thus far made it useless to open the bundles of cotton and the rolled blanket, which were put aside for further experiments.

On the 1st of February a second experiment was made in the same disinfection chamber upon test-organisms prepared as before. In this experiment the conditions were changed by the introduction of steam into the chamber through a tube connected with a retort outside. Two litres of water were evaporated, and the steam passed into the chamber during the first four hours of the experiment. The amount of  $\text{SO}_2$  in this experiment was increased to twenty volumes per cent.; the time of exposure was twelve hours; the result as follows:

*Organisms exposed in coat-pocket.*

Coat suspended from wall, and pledgets of cotton loosely folded in filter paper, with ends of packages open for free admission of gas.

*B. subtilis* (spores), moist and dry. Abundant development in twenty-four hours in culture fluids inoculated with the exposed spores.

*B. anthracis* (spores), moist and dry. Abundant development of anthrax filaments in culture-tubes inoculated with this material.

*Micrococci*—pure culture—from blood drawn from inflamed area in a case of erysipelas. Two dry and one moist pledget. Pure cultures of this micrococcus were obtained from all of these after exposure in coat-pocket as described.

*Organisms exposed on pledgets of cotton in open tubes placed upon the floor of disinfection chamber.*

*B. subtilis* (spores), dry and moist. Abundant development in culture fluids.

*B. anthracis* (spores), dry and moist. Pure cultures obtained from exposed material.

*Micrococci*, from erysipelas (same stock as above), two pledgets, dry. Pure cultures obtained from both.

The complete failure to destroy the test-organisms under the conditions mentioned induced me to try the following experiment:

*February 2.*—Pure  $\text{SO}_2$  in liquid form was poured into a tube (experiment in duplicate) containing spores of *B. subtilis* on dry cotton. The rapid volatilization of the liquid, produced, of course, intense cold. As the tube was long and narrow, and volatilization was restrained by the low temperature, the time of contact with the  $\text{SO}_2$  was at least ten minutes. The vitality of the spores thus brought in contact with liquid  $\text{SO}_2$  was not impaired, as shown by culture experiments.

The experiment was repeated Feb. 5, with anthrax spores upon moist cotton. The result was the same. Anthrax filaments appeared in cultures inoculated with these spores at the end of forty-eight hours.

It was evidently useless to extend these experiments so far as spores are concerned; but the question remained as to the practicability of destroying pathogenic micrococci and bacilli without spores. As Koch has shown that the loss of sulphur dioxide is very rapid from a room which is carefully closed to prevent its escape, the following experiments were made in a gas-tight receptacle:

*February 2.*—The following named test-organisms were placed under a bell-jar, having a capacity of one gallon. The jar was sealed below by resting in a trough containing mercury. Enough liquid  $\text{SO}_2$  to make twenty volumes per cent. was introduced into this jar, and was, of course, quickly volatilized. The time of exposure was eighteen hours; result as follows:

*Micrococci* (pure culture) obtained from a case of vaccinal erysipelas (culture started from drop of blood drawn from inflamed area). One moist and two dry pledgets of sterilized cotton, previously saturated with this culture, were exposed in glass tubes open at one end. Also a few drops of the culture fluid poured into a similar tube. Result negative; disinfection was complete, as proved by attempt to start cultures from the exposed organisms.

*Micrococci* (pure culture) from blood of woman with puerperal septicæmia (fatal case). Exposed one pledget of cotton, moist, in glass tube; and a few drops of culture fluid in the bottom of two other glass tubes; disinfection complete.

*Micrococci* (pure culture) from vaccine vesicle. Exposed two pledgets of cotton, moist, and one tube containing a few drops of a pure culture; disinfection complete.

*Micrococcus ureæ* (pure culture in beef tea). Exposed one pledget of cotton, moist, and one tube containing a few drops of culture; disinfection complete.

Having determined by this experiment that  $\text{SO}_2$ , even in the absence of moisture, may kill micrococci, a second experiment was made to ascertain whether the quantity of the disinfecting agent could be reduced, so as to bring it more nearly within practical limits.

*Feb. 7.*— $\text{SO}_2$  was introduced under bell-jar, as above described, and the following test-organisms exposed to its action for twenty hours:

*Micrococci* from vaccinal erysipelas.<sup>1</sup> Exposed two pledgets of cotton, dry, in glass tubes. From one of these, cultures of this micrococcus were obtained; cultures inoculated from the other remained sterile. Two pledgets of cotton moistened with a recent culture were also exposed. Cultures from these remained sterile. A few drops of a fresh culture placed in the bottom of a glass tube subsequently fertilized sterilized culture-fluids—failed to disinfect.

*M. ureæ*, exposed upon two pledgets of cotton, moist; disinfection complete.

In the above experiment the material to be disinfected, was placed near the bottom of the jar. In the following experiment a taller jar, having a capacity of five litres, was used; and the test-organisms were exposed upon a shelf near the centre of the jar. As before, liquid  $\text{SO}_2$  was introduced in an open beaker, in a proper quantity to make four volumes per cent. The time of exposure was twenty hours.

*Micrococci* (pure culture) from vaccine vesicle, on cotton, moist; disinfection complete.

*Micrococci*, puerperal septicæmia, pure culture on cotton, moist; disinfection complete.

*Micrococci*, vaccinal erysipelas, pure culture on cotton, moist; failure to disinfect.

*Micrococci*, from vaccine vesicle, on cotton, dry, in duplicate; disinfection complete in one, failure in the other.

I have also tested the germicide power of an aqueous solution of  $\text{SO}_2$  on the above-mentioned micrococci, with the following results:

*February 5.*—Equal parts of a recent culture of micrococci from vaccine vesicle, micrococci from case of puerperal septicæmia, and *M. ureæ*, were added to a standard solution of  $\text{SO}_2$  containing five per cent. by weight. The time of contact was two hours, after which two culture tubes were inoculated from each; no development occurred—disinfection complete.

*7th.*—The standard solution of  $\text{SO}_2$  (five per cent.) diluted to 1 : 50 was added, in equal portions, to a pure culture of the micrococcus from vaccinal erysipelas (making the dilution 1 : 100 = 0.05 per cent. of  $\text{SO}_2$  by weight, or 1 : 2000). Cultures inoculated after two hours' contact remained sterile. At the same time a solution of 1 : 100 was added to a culture of the micrococcus from a vaccine vesicle (*i. e.*, 1 : 4000 by weight); in this case disinfection failed.

*10th.*—The above experiment was repeated with the last-mentioned micrococcus with solutions containing 1 : 1000, 1 : 2000, and 1 : 4000, of  $\text{SO}_2$  by weight (after admixture with the culture fluid).

The result corresponded with that previously obtained. Disinfection was accomplished by the solution of 1 : 1000 and 1 : 2000; but failed when the amount was reduced to 1 : 4000.

<sup>1</sup> The writer does not commit himself to the view that the micrococci from the various sources mentioned are specifically different, and the cause of the morbid phenomena in the individuals from whose blood the cultures were started; inasmuch as he has not been able to obtain any definite proof that such is the case. On the other hand, he admits that it is extremely probable that they are concerned in the development of these morbid phenomena, and are in fact pathogenic organisms.

11th.—The same result was obtained with a recent culture of the micrococcus from case of puerperal septicæmia—*i. e.*, the standard solution of five per cent., when diluted with forty-nine parts (1 : 50) of distilled water, in two hours' time destroyed the developing power of this micrococcus, while the same solution diluted to 1 : 100 (1 : 4000 of SO<sub>2</sub> by weight) failed to disinfect.

These results correspond with those reported by Jalan de la Croix, who found that one grain of SO<sub>2</sub> in 2000 of bouillon filled with growing bacteria, causes development to cease, and destroys the vitality of these bacteria. When spores were present, however, it was necessary to increase the amount to 1 : 135 (in how long a time?).

I may add, as a matter of interest, although not directly relating to our present object, that the same standard solution of five per cent. by weight, when added to culture fluids in the proportion of 1 : 250 (= 1 : 5000 of SO<sub>2</sub> by weight) prevents the development of all of the above-mentioned micrococci; while 1 : 500 (1 : 10,000 of SO<sub>2</sub>) fails to prevent the development of the bacteria of putrefaction, or of the micrococcus from a vaccine vesicle, upon which organisms alone I have thus far tested the antiseptic power of this agent. These results also correspond closely with those of De la Croix, and show that sulphur dioxide ranks very high as an antiseptic.

In view of the experimental data recorded it is evident that the use of sulphur dioxide for the disinfection of spore-containing material must be abandoned. This is the conclusion of Wolffhügel<sup>1</sup> on the basis of Koch's biological tests, and his own experiments. He is therefore inclined to abandon entirely the use of this agent for disinfecting purposes. He says, with reference to the question of its use for material not containing spores, that the answer to this question has very little interest, from a practical point of view, as it is impossible to say in the present state of knowledge whether we have to deal with material free from spores or otherwise. Under the circumstances Wolffhügel thinks that we will do well to abandon sulphur dioxide, and to use only such methods of disinfection as will be effective without reference to the presence or absence of spores.

I am not ready to go to this length, and to recommend the abandonment of an agent which enjoys the confidence of practical sanitarians for the destruction of the infection of smallpox, of scarlet fever, of diphtheria, of cholera, and of yellow fever, upon the ground that it fails to destroy the spores of the anthrax bacillus, or of *B. subtilis*. For the truth of the germ theory has not yet been definitely established for any one of the diseases named, and Wernitz has shown the power of this agent to neutralize non-living ferments. Admitting, however, as I do, the great probability that the infectious agent in these diseases is a living germ, we have good reason for believing that spores are not formed in any one of these diseases. We must not then be too exacting with reference to this agent, until we are able to recommend something better in its place for the pur-

poses to which it is commonly applied, viz., for the disinfection of apartments and ships.

My experiments show most conclusively that it does destroy the specific infecting power of vaccine virus dried upon ivory points, when present in the air of a disinfecting chamber in the proportion of one volume per cent., and that in aqueous solution it destroys the vitality of various micrococci in comparatively small amounts. It is even practicable to destroy these organisms dried upon pledgets of cotton by long exposure in gas-tight receptacles. But the conditions of success are such that it appears almost impracticable to conform with them in practice on a large scale, and it is evident that much of the so-called "disinfection" with this agent is a farce.

I am convinced that the percentage of SO<sub>2</sub> present in the disinfection chamber, above a certain limit, is of less moment than certain conditions relating to the material to be disinfected. Thus Koch succeeded in destroying the vitality of anthrax bacilli, still moist, from the spleen of a mouse, and attached to silk threads, by exposure for one hour to 0.48 volume per cent. of SO<sub>2</sub>, in a disinfection chamber the atmosphere of which was loaded with moisture. In my own experiments with vaccine virus upon ivory points a still smaller amount (5 volumes per 1000) was effective in four hours time. Here the favorable conditions are without doubt the very thin stratum of material to be disinfected, and the fact that it is thoroughly moistened.

Admitting that, in the absence of spores, microorganisms suspended in the atmosphere, or attached to the surface of objects may be destroyed by sulphur dioxide, when generated in a sufficient quantity in a well-closed apartment, and in the presence of moisture, the question remains whether the same object may not be as well accomplished by thorough ventilation, and by washing all surfaces—walls, ceilings, floors, furniture, etc., with a 1 : 1000 solution of mercuric chloride, which we know to be promptly destructive of germs of all kinds.

#### DIPHTHERITIC CROUP—LIFE SAVED BY REMOVAL OF FALSE MEMBRANE FROM THE RIGHT BRONCHUS.

By E. FLETCHER INGALS, M.D.,

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OF DISEASES OF THE THROAT AND CHEST, WOMEN'S  
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AND

J. E. WHITE, M.D.

PATIENT A. A., aged five years and five months. First complained of his throat Friday, October 16, but until the following Wednesday night nothing serious was anticipated. That night the parents noticed croupy symptoms and the next morning Prof. Ingals was called and found small diphtheritic patches on the tonsils, with stridor in respiration and dyspnoea on any exertion. Bromide of potassium and ammonium with small doses of belladonna and opium every two hours were ordered to relieve the spasmodic tendency. One grain doses of calomel were given every hour to prevent further formation of false

<sup>1</sup> Op. cit., vol. i. p. 232.



membrane and two grains of quinine were ordered every fourth hour. Dr. Ingals was summoned again early the next morning, and fearing that an operation would be necessary, he asked Prof. D. W. Graham to accompany him. The child had passed a poor night but was then breathing better, and as there was no recession of the soft parts of the chest, an operation was not advised at that time. The child was given two grain doses of calomel every hour, and chloral was added to the antispasmodic mixture. The parents were warned of the danger and directed to telephone at once should greater dyspnoea occur.

Dr. Ignals was again summoned about noon, and at twelve o'clock, assisted by Doctors Graham and J. E. White, he opened the trachea. The patient rallied promptly after the operation and shortly afterward the pulse was found to be 130 and the temperature 102° F. The patient was left in charge of Dr. White. Breathing continued easy and there was no increase of temperature for about forty-eight hours, when a little more fever developed and some dyspnoea occurred, but it did not become severe until six or seven hours later. In the evening of the second day, about seven o'clock, Dr. Ingals was called hurriedly on account of sudden and severe dyspnoea. He found the patient gasping for breath and nearly suffocated.

The tubes had been removed by Dr. White and every effort made to clear the trachea, but nothing was found within reach of the ordinary tracheal forceps to account for the obstruction. After satisfying himself that the opening and the trachea were free, Dr. Ingals introduced a flexible tube throat forceps as low as the bifurcation of the trachea and finally into the right and left bronchi. At one time the septum between the two main bronchi was accidentally grasped, but the resistance felt enabled the operator to loosen his hold without injury to the part. Finally, when about despairing and when the patient's death seemed certain, a large plug of false membrane was drawn from the right bronchus, and the dyspnoea was immediately relieved. From that time until about two o'clock A.M. the patient did well, when dyspnoea again occurred, and again Dr. Ingals removed a plug from the right bronchus with the effect of giving immediate relief. Subsequently there was no dangerous dyspnoea. During the first two or three days after the operation, the mild chloride was given in diminished doses, and was then discontinued.

During the greater portion of the first week half a teaspoonful of alcohol was given in milk every two hours, and from eight to ten grains of quinine were given daily in two grain pills. A part of the time a stimulating expectorant was employed with decided benefit. For the first two days after the operation a steam atomizer charged with a solution of carbolic acid gr. xxx, glycerine ʒj, bicarb. sodæ ʒj to lime-water Oj, was kept running close to the bed about two-thirds of the time. Subsequently, for several days it was kept going constantly, and whenever the secretions seemed to be getting dry it was held close to the tube for a few minutes so that the steam was inhaled.

The diphtheritic membrane remained in the throat

about a week. Eight days after the operation the child was still unable to breathe with the tube closed.

Two days later a smaller tube with a large fenestra was inserted, and the child was able to breathe when the tube was corked. Two days later, fourteen days after the operation, the tube was removed, and ten hours later the wound had contracted so that no air escaped. Healing speedily occurred, but the child's larynx remained sensitive to the slightest changes of temperature for many weeks.

In this case the operation was done promptly, and gave immediate relief, there being no membrane at the time below the opening into the trachea. The diphtheritic membrane, however, finally spread to the trachea and bronchi, and the time when such cases generally prove fatal—that is, between the forty-eighth and seventy second hour after the operation—this case would have been lost but for the removal of the plug of false membrane from the bronchus. Possibly many of the cases which are lost at this stage, might be saved by a similar procedure.

The indication for such procedure is severe dyspnoea, coming on rapidly or suddenly when the trachea is known to be free. Feeble respiration over one lung only might indicate the position of the false membrane.

#### STRANGULATED INGUINAL HERNIA. DURATION OF SYMPTOMS SIX DAYS. OPERATION: REMOVAL OF PORTION OF OMENTUM. RECOVERY.

BY WM. G. PORTER, M.D.,  
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T. E. V., American, æt. 20, a brakeman, was admitted to the Presbyterian Hospital, in Philadelphia, on Tuesday, October 21, 1884, with a strangulated scrotal hernia of the right side, and gave the following history:

About five years ago he noticed a tumor about the size of a hickory-nut in the right groin. "It came and went," and he did not know that it was a hernia until about two years ago. He never wore a truss, and it never gave him any trouble. On the preceding Wednesday night, October 15th, while marching in a political procession, he was suddenly seized with the symptoms of strangulation. He had no movement of the bowels from the time of seizure, and had suffered with pain and obstinate vomiting, which had been of a stercoraceous character for some time previous to admission. His treatment before he came to the hospital had consisted of castor oil and morphia internally, ice locally, and taxis, all of which had failed. On admission his expression was anxious, his abdomen was tympanitic, his pulse 100, his temperature 100½°, his tongue was dry and covered with a yellowish fur; he was not suffering much pain, and he had vomited stercoraceous matter an hour before his admission. The symptoms having existed so long no effort at taxis was made, but the patient was at once etherized, and the operation for strangulated hernia performed. On opening the sac quite a mass of omentum and a small knuckle of intestine were found. The intestine was dark but otherwise sound, but the omentum was considerably bruised and largely

adherent to the sac. The adhesions were separated, the constriction relieved by the knife, and the bowel returned to the abdomen. A portion of omentum—about as large as an ordinary sized adult hand—which I feared would slough, was removed, and then the stump of the omentum, *including the sac*, was transfixed with a needle, armed with a double ligature, and securely tied just at its exit from the inguinal canal, the edges of the wound were brought together by a few interrupted sutures, a sufficient opening being left at its most dependent portion for drainage.

Shock was quite marked, and hypodermics of whisky were given with strong ammonia by inhalation and aromatic spirits of ammonia by the mouth as soon as he was able to swallow. The operation was performed at 5.30 P. M., and at 6.30 P. M. he had recovered from the ether and was complaining of great pain. Morphia gr.  $\frac{1}{8}$  was given hypodermically, and this was repeated at 7 o'clock, and at 8.30 gr.  $\frac{1}{8}$  more was given by the mouth. The pain was now entirely relieved, and he went to sleep. His pulse was 116, temperature 98°, and respiration 24. He retched somewhat after the ether, and belched wind that had a decidedly intestinal odor, but he did not vomit. The patient was kept fully under the influence of morphia. Small fragments of cracked ice were allowed and occasional hypodermics of whisky were given.

On the next day his temperature was 101°, and on the following day 102°. On the second day he passed some wind from the bowels; the only nourishment allowed was very small doses of lime-water and milk, equal parts, and he was kept fully under morphia. Warm fomentations were applied to the abdomen.

At 3 o'clock A. M., on the 24th, he had a liquid fecal movement per anum, another at 5 A. M., and another at 6 A. M. The wound gaped, and its edges sloughed somewhat; several bruised portions of skin were involved in the incision at the time of operation, these all sloughed. A charcoal poultice was applied.

The ligature from the stump of the omentum came away on the 28th, one week after the operation, the wound cleaned off and gradually granulated and cicatrized. The patient was allowed to get out of bed on the 15th of November, and was discharged cured, and left the hospital, wearing a light truss, on the 4th of December.

The points of interest about this case are the length of time which elapsed between the appearance of the symptoms of strangulation and the operation, with the recovery of the patient, the exceedingly small quantity of nourishment which is necessary to support life when the patient is kept under the influence of morphia, and the treatment of the omentum.

In regard to the first, the fact that the bowel was found in as good condition as it was after the long persistence of the strangulation, was largely due to the amount of omentum which was found in the sac, and which completely surrounded the bowel. In another case of strangulated hernia operated on a few days ago, in which the symptoms had persisted for five days previous to the operation, and in which very little omentum was found, the bowel was found to be perforated in two places.

In regard to the second point, while the symptoms of strangulation continued, and the patient was vomiting, of course little, if any, nourishment could have been absorbed, so that from the fifteenth to the twenty-first the patient was practically without food; during the night of the 21st whiskey f3ij, milk f3ij, and lime-water ʒj were mixed together, and a teaspoonful of the mixture given every two hours, and on the 24th of the month, nine days after the commencement of his symptoms, he was only taking in twenty-four hours twelve ounces of milk; this amount was very gradually increased; and solid food was not allowed for several weeks. The patient became very tired of his monotonous diet, but never complained of hunger during his treatment, although naturally he was a hearty eater.

In several cases in which I have adopted this method of treating the omentum, and in others in which I have seen it done, I have been much pleased with the results.

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## MEDICAL PROGRESS.

A RARE CASE OF PURULENT PERITONEAL EXUDATION WHICH SIMULATED ASCITES; CURE BY PUNCTURE.—DR. B. PERNICE, in the *Gazetta degli Ospitali*, No. 33, 1884, records a rare case of purulent peritoneal exudation which simulated ascites. The patient was a man 25 years old. Three years previously he had fallen, and struck his belly on the right side, from which he experienced severe pain and cramp. Nevertheless in a few hours he was able to go home alone, though subsequently fever, pain in the abdomen, and vomiting followed, and he was compelled to keep his bed about a month. At the end of this time, he resumed his work, and considered himself perfectly well, inasmuch as all pain had disappeared, and his general nutrition was excellent. Shortly, however, the pain returned, and seriously interfered with his work by rendering respiration difficult. He was now compelled to enter a hospital. After remaining a month, he was discharged improved but not cured, and soon after the former symptoms returned with increased violence.

The patient's history was that of a perfectly healthy man until three years ago; since that time he had indulged freely in alcoholic drink. Examination showed a thoracic temperature of 98½° F. The belly was very voluminous, not painful but only slightly sensitive on deep pressure. Palpation revealed fluctuation over the whole belly, and percussion showed that nearly the whole cavity was filled with fluid, only a small zone in the umbilical region being tympanitic. Accurate deep examination was impossible owing to the tense condition of the abdominal walls, and the abundant collection of fluid. A line carried from the ensiform cartilage to the os pubis, measured 20 inches. The greatest (abdominal) circumference was 41 inches. The inferior border of the liver was not distinguishable, but the upper was normal. The spleen was also normal. Urine normal, with no trace of albumen. The fact that the man was a drunkard, rendered it probable that the fluid was ascitic. On the other hand, the traumatic origin of the disease together with the history of vomiting and fever, and the normal condition of the heart

and other organs, pointed to the existence of chronic peritonitis. Puncture was at length resorted to, and about 18 quarts of an opaque purulent fluid were evacuated, with the entire relief of the patient. The abdomen on examination was somewhat resistant, but no evidence of any abdominal neoplasm was discoverable, and the lower border of the liver was found to be normal.

Three months afterward, the patient again returned to the hospital, and 12 and 8 quarts of purulent fluid were again evacuated by puncture. He was detained some days after the operation in order to observe his condition, but there was no elevation of temperature, and he did not complain of abdominal pain.

The man shortly returned to his occupation, and, when seen some time later, had completely recovered. From the data furnished by this case, Dr. Pernice concludes that in similar conditions, puncture at an earlier stage of the disease is indicated.—*Centralbl. für die Gesamte Therapie*, February, 1885.

**TREATMENT OF BROMIDROSIS OF THE FEET.**—DR. J. S. STEWART, in the *Edinburgh Med. Journal* for March, 1885, recommends as the most satisfactory treatment, to have the feet thoroughly washed in hot water, then steeped for a few minutes in a solution of permanganate of potash of the strength of from 4 to 6 grains in the ounce of water. The feet are then dried, not to be again wetted until complete exfoliation of the tanned cuticle has taken place.

Hebra's lead plaster ointment is then thickly spread on strips of cloth about one inch and a half broad, and the foot covered from the toes back over the heel as high as the malleoli with these, arranged and applied like a scultetus bandage. Each toe should first be wrapped round with a strip of clean rag half an inch broad and thickly spread with the ointment. This dressing should be renewed every twelve hours with fresh rag and ointment, for a period varying from ten to sixteen days, according to the severity of the case and the thickness of the heel skin. In most cases the odor will be very much diminished by the end of the third day, and will not be perceptible by the ninth. The shedding of the skin takes place *pari passu* with the growth of the new cuticle, and may not be completed until the end of the third or even of the fourth week.

**A NEW TEST FOR BILE ACIDS IN THE URINE.**—DR. OLIVER, of Harrogate, has, during the past week, been demonstrating in several of the London hospitals what he believes to be a new test for the detection in the urine of the derivatives of the bile salts. It is in the form of a test solution, and also in that of test paper. The reaction of the test is founded on the physiological fact that when the bile mingles with the acid solution of peptones in the duodenum, the proteids are instantly and completely precipitated. The test solution is an acidulous antiseptic solution of peptone, and does not present to the urine a constituent extraneous to the organism. When brought into contact with a urine containing a bile-salt derivative, a precipitate resembling that of albumen when thrown down by nitric acid at once appears. By using a standard of opacity to represent the very delicate reaction induced in normal urine,

Dr. Oliver showed how the quantity of the bile derivatives, as they appear in the marked deviations encountered in disease, can be readily gauged. He has, we learn, found bile acids plentifully present not only in the urine of jaundice and of other hepatic affections, but in that of several cases of anæmia (simple or idiopathic, leucocythæmic or malarial), and of other morbid conditions; and his observations generally appear to be of some clinical interest. We understand that Dr. Oliver is preparing for early publication the data he has collected.—*Lancet*, March 7, 1885.

**ACTION OF THE ALKALOIDS OF QUEBRACHO.**—DRS. E. HARNACK and H. HOFFMANN, in the *Zeitschrift für klin. Med.*, Bd. viii. Heft 6, 1884, give the following résumé of their researches on quebracho.

The bark contains four crystallizable alkaloids, *aspidospermine*, *quebrachine*, *quebrachamine*, and *aspidospermamine*, and also two amorphous alkaloids, *aspidosamine* and *hypoquebrachine*.

The writers have studied the action of these alkaloids upon frogs and mammals, and have arrived at the following conclusions:

All the alkaloids of quebracho exercise a paralyzing influence upon respiration in mammals as well as frogs, and in this respect quebrachine has a marked power of action. All the alkaloids excite a feeling of nausea; but aspidosamine alone causes vomiting. Hypoquebrachine and aspidosamine paralyze only the extremities of the motor nerves. They all paralyze directly the striated muscular fibres of frogs, but in mammals this effect is much less marked and even doubtful. In frogs the heart is rapidly paralyzed by these alkaloids, but in mammals this effect is less rapid, and usually the organ continues to beat after the complete cessation of respiration. Aspidosamine in its action upon frogs closely resembles apomorphia. This similarity in action does not obtain in man. Thus the emetic effect of apomorphia is shown after the administration of a much smaller dose than will produce vomiting with aspidosamine; and apomorphia causes violent excitement of the nervous centres, particularly the centre of respiration, whereas aspidosamine, on the contrary, quiets the respiration, and renders it superficial. The general effect which the alkaloids of quebracho have of lowering the excitability of the respiratory centre renders them of real therapeutic value, and in this respect ranks them along with morphine and hydrocyanic acid in therapeutic efficacy. They are indicated in dyspnoea depending upon disease of the circulatory apparatus to the exclusion of those originating in insufficient oxygenation or arterialization of the blood. Benefit, nevertheless, may be obtained from their use in dyspnoea due to asthma, chronic pneumonia, and intrathoracic effusions.

The alkaloids which may be best substituted for quebracho are quebrachine and aspidosamine. The latter is less energetic in its action, but is preferable on account of its special effect upon the respiration. However, it is less easily obtained pure than quebrachine, and besides has such marked emetic power, and is absorbed with so much difficulty that quebrachine or its salts is generally to be preferred.—*Gazette Hebdomadaire de Médecine et de Chirurgie*, February 13, 1885.



# THE MEDICAL NEWS.

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SATURDAY, MARCH 28, 1885.

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## PHYSIOLOGICAL EXERCISE.

I AM no friend to violent exertion, myself," said the *Antiquary*,—"a walk in the garden once a day is exercise enough for any thinking being—none but a fool or a fox-hunter would require more."

We may not agree with Sir Walter's hero in his conception of physiological exercise; but we are equally remote from the present disposition to apotheosize the apostles of physical culture. The truth, as might be expected, lies between these extreme views. There must be a happy mean in which the balance is accurately adjusted, and exercise and repose are taken in proper measure to secure the highest efficiency of the human machine. The amount and character of the exercise best suited to produce and maintain this efficiency, are, then, the problems awaiting solution.

How far is the present enthusiasm—craze—for athletic sports, justified in human experience? The most casual inspection suffices to acquaint us with the fact that those who are required frequently to exert their utmost strength—as laborers and porters—and those fond of exhibiting their prowess as athletes, early exhaust the sources of power, and are short-lived, even if they escape the accidents due immediately to over-exertion. It is equally evident that those who reach the most advanced life are persons who have combined cheerful, continuous, even severe mental occupation with very moderate exertion of their physical powers—persons whose attention has been given to intellectual pursuits, and who have taken systematic exercise in a mild form.

Reduced to the last analysis, there are two objects to be subserved by exercise: to supply to the more

rapidly circulating blood an adequate quantity of oxygen; to increase the activity of the nutritive processes, especially in the muscular system; and, as a necessary result of these, improved appetite and digestion wait upon a greater demand for aliment. It goes without saying that exercise increases the action of the heart and the frequency and depth of the respiratory movements. It is equally apparent that during active bodily movements the muscles receive and appropriate more material both for the evolution of force and the regeneration of their own structures, so that the physiological interchanges, of which they are the seat, become greatly more rapid and thorough. How much exercise, then, is needed to comply with the physiological requirements? Are athletic sports and exercises best adapted to accomplish the object in view, or will "a walk in the garden once a day" suffice? As it is evident that ordinary walking exercise will effect the results desired from the physiological standpoint, it becomes necessary to appeal to experience to decide the case of athletic games and sports.

As, indeed, the question of exercise can arise only in respect to the sedentary, and growing youths of both sexes, we have but to consider the effects of athletics on such subjects. In them the ill-results of violent physical exertion have unfortunately been too often observed not to be distinctly recognized. These results are, as all the world knows, cardiac troubles, aneurism, pulmonary emphysema, joint diseases, and other affections. The risk of such lesions is in direct ratio to the lack of preparation. Whilst it is true that graduated exercises may lead up to the most elaborate and severe feats, no amount of training suffices to obviate all the dangers of the necessary overexertion. Everybody is familiar with the history of Dr. Winship—Boston's strong man—who performed unparalleled feats of strength, but died in the thirties with some disease of the great vessels, produced by his tremendous exertions. If those who are trained in all athletic exercises experience such ill-results from their practice, what must be the consequences to the sedentary who suddenly takes on himself the performance of such violent feats. If athletics are to continue their hold on popular esteem, it is time that aptitude should be considered and a just appreciation of the dangers of overexertion should be made apparent.

For the great mass of the population, a true conception of a merely physiological exercise is of vastly greater importance than any training in athletics. It is in this direction that men and women need to turn to accomplish a higher physical development, rather than to dumb-bells, the crossbar, the trapeze, and all the paraphernalia of systematized movements. For these contrivances must, to most men and women, be either unsuited or injurious. The

present rage for athletics properly so-called, should, therefore, be discouraged, in that it leads the public mind away from physical training that may be universally employed. If special movements and contrivances therefor be accepted as the proper solution of the problem of exercise, the tendency will be, of course, to restrict such physical training to those who are in a position to avail themselves of such opportunities, whilst the mass of people will hold themselves absolved from attempting the unattainable. Within the hearing of the masses, a crusade should be preached to arouse them to the needs of an available physiological exercise. We may define this physiological exercise for children and youths of both sexes to consist in the unrestrained movements of the usual play and games, and for adults in walking, running, leaping, horseback riding, etc., within the limits imposed by the physical condition of each person.

An important element in the problem of physiological exercise is the time when it is to be undertaken. In the prescription of the physician, too often this necessary question is left to the decision of the patient; on the other hand, the advice given may be very unwise. We have known delicate valetudiniaries, who had by choice, or habit, or necessity, taken a light supper in the early evening, directed to exercise before breakfast. It may be well in the case of those who have dined sumptuously at night to rid the organism of surplus and effete material, before partaking of the morning meal, but as a rule this is an inappropriate time for active exertion. To utilize the increased supply of oxygen which is the chief purpose of exercise, the best time to accomplish it is when the foods prepared by the primary assimilation, are pouring into the blood, for, then, this important agent is needed in full measure, to perfect the final changes, and to secure the elimination by the same agency—oxidation—of effete substances. If this physiological principle be truly grounded in the requirements of nature, the proper time for exercise is three or four hours after meals.

An application of the same principle may, with eminent propriety, be made to the question of work after eating. As the digestive functions require for their best performance all of the available surplus blood of the body, it is obvious that active exercise and work which divert this surplus blood to the muscles, must interfere with the proper disposition of the food, and either arrest its solution and absorption, or so interfere with these processes as to prepare only crude matters for entrance into the circulation. An application of the same principle should fix the hour for the most important meal at a time after the work of the day has been done. If, then, dinner be taken in the evening, as, for physiological reasons, seems most suitable, some active exercise is needed before retiring for the night.

An application of the same principle may equally be made to the needs of men of letters, for the work of the brain, as of the body, demands the utilization of all the available blood, since in the performance of this tidal function, now the digestive organs, again the muscles, and now the brain, require the transferable surplus for their best work, and only evil results when one function disputes with another the supply of necessary sustenance. These are trite observations, but this seems to be an occasion when their restatement is desirable.

#### PROPAGATION OF CHOLERA BY POLLUTED WATER.

It is now pretty generally conceded that the specific contagium of cholera is chiefly to be found in the bowel evacuations of persons suffering from this disease, and that the infecting matter must gain entrance into the intestinal canal to produce cholera in another. Infection may take place through the medium of air or food, but drinking-water is a very frequent and common means of dissemination. Since Dr. Snow first announced his views, in 1849, respecting the propagation of cholera by polluted water, founded on facts gathered at Horsleydown, Wandsworth, and other places, and subsequently confirmed by evidence in the famous and conclusive Broad Street pump case, other and abundant evidence of the most unequivocal character has been collected, which goes far to establish this opinion. Hence many of the former opponents of the theory, among them Pettenkofer, are forced to admit that this mode of conveyance of cholera does actually exist.

The evidence from India, the home of the disease, is, in the main, confirmatory of this view. Drs. Macnamara, Townsend, and Cleghorn, who have devoted special attention to the subject of cholera, have all furnished very strong proofs of the fact that the dissemination of this disease is largely dependent on the use of impure water. It is a matter of common observation in that country, that whenever the use of polluted water has been abandoned and a pure supply substituted, the disease has quickly abated. This was notably the case in Calcutta, which formerly procured its supply of drinking-water from open tanks, and, to some extent, from the Hoogly River, both of which sources were exposed to pollution. After an improved supply had been obtained, there was a marked diminution in the cases among all classes of the inhabitants.

The cities of Dantzic and Königsberg, in Germany, used to suffer equally from cholera whenever the disease made its appearance in Europe. Dantzic procured a supply of water from a new and unpolluted source and ceased to suffer from the disease, while Königsberg continued to use the old supply, and continued to suffer. During the prevalence of cholera in Holland in 1866, Dr. Ballot states that all those

towns in which rain-water alone was drunk, had either no cases of cholera or very few single cases, and these were supposed to have been imported; while, on the other hand, in those places where the water-supply was derived from the canals or wells, both highly polluted with sewage, the disease prevailed. The City of Amsterdam, which is supplied with rain-water carefully collected and distributed, had only 4 deaths per 1000, while other cities and towns supplied with water from the polders and canals had a rate of mortality of from 16.8 to 17.7 per 1000.

The outbreak of cholera mentioned by Prof. Chandler as occurring in a village near the Central Park, New York, in 1866, was traced to the polluted water of the village well. In the celebrated case of the Van Brunt Street well, Brooklyn, which was polluted by sewage, the disease spread among the fifty families supplied by it, until the use of the water was prohibited. Dr. Simon has shown, that in London, those houses supplied with polluted water from the river furnished a death-rate from cholera equal to 13 per 1000, while other houses situated under quite similar circumstances except that they were supplied with pure water, furnished a death-rate of only 3.7 per 1000. Similar examples are furnished by Frankland in the case of London, by Schifferdecker in the case of Königsberg, and by Parkes in the case of Berlin.

There is no proof that cholera may be produced by water uncontaminated by cholera evacuations, though it is probable that the use of water containing organic impurities, by causing a constant tendency to diarrhoea, and by lowering vitality, predisposes to this disease. As Dr. Wilson remarks, this much, however, appears certain, that whenever cholera evacuations make their way into drinking-water, we may expect to find the disease burst forth with the greatest virulence and fatality amongst those who use the water, and that, indeed, the endemic area will approximate with remarkable closeness to the limits of the district which it supplies.

Water specifically contaminated by cholera evacuations being the most common vehicle for the propagation of this disease, it may be stated with almost positive assurance that a town or community having a supply of pure water and a perfect system of drainage need have no dread of an invasion of cholera, even though the disease may have been brought into the place.

We have said this much with the view of calling attention to the necessity of strengthening these two prominent means of defence against the threatened invasion of cholera. We would especially caution the public against the use of water from wells in inhabited districts, which, as a rule, are grossly polluted by the soakage from cesspools and drains. The practice of obtaining a ready water-supply and a

ready house-drainage in the same permeable strata is a common and most pernicious one, and it is particularly dangerous when a disease such as cholera invades a place. In many situations the only practicable method of obtaining a water-supply is by means of shallow or deep wells. In such cases the contamination of the soil by excretions should be most carefully guarded against. But in towns and cities provided with a public water-supply and a general sewerage system, pump-wells and cesspools are permitted side by side. It is an easy matter to force the abandonment of such wells, and the necessity for such action is particularly urgent at this time.

As cholera may be spread to a limited extent by other agencies, such as the air or food, it may not be out of place to remark that the most effectual means of prevention lies in the complete destruction of the infecting matter at its very issue from the body. For this purpose one drachm of corrosive sublimate with an equal quantity of common salt, dissolved in one gallon of water, is one of the most efficient disinfectants, and by its use we may prevent the infecting material from reaching the intestines of other persons, and prevent them from getting cholera.

#### CUNEIFORM TARSTOMY FOR CLUBFOOT.

In the *Lancet* for February 14, 1885, may be found an abstract of a paper on the radical cure of clubfoot, read by MR. RICHARD DAVY before the Royal Medical and Chirurgical Society of London, in which the author records twenty-six cases of equinovarus, varus, and equinus, treated by Davies Colley's operation of excising a wedge-shaped portion of the bones composing the transverse tarsal joint. The results, briefly stated, were one death from septicæmia, or a mortality of less than four per cent.; a shortened symmetrical foot; dispensation with instruments; and locomotion on the sole. Antiseptics were not used, the open method of treating the wound having been practised, and the average stay in the hospital was seventy-seven days. Mr. Davy urged the operation in inveterate cases, and was inclined to plead for its adoption in young persons under certain circumstances.

In the discussion which followed the reading of the paper, the opinion seemed to be pretty general that Colley's operation was required in very rare cases, and that it was not indicated at all in young children. Although the procedure saves time, and tries the patience of the surgeon less than milder measures, the mortality must be far lower than four per cent. before it can obtain general recognition or replace the simpler, if more tedious, methods of treatment. Up to ten years of age, we believe, with Dr. Willard, of this city, that it is utterly unjustifiable. As Mr. R. W. Parker pointed out, the great obstacle to straightening talipedic feet is adapted



shortening of the ligaments upon the inner side and the sole of the foot. Hence, he recommends the subcutaneous division of these shortened bands in young persons, and for inveterate cases in the adult, before severer measures are adopted. In this city, where these deformities are most successfully treated, the common practice is to soften the structures of the foot for about ten days by the application of poultices, divide the plantar fascia, and then forcibly rupture the shortened ligaments by steadying the foot with the knee, grasping the limb above the ankle with the left hand, and making the necessary movements with the right hand grasping the anterior two-thirds of the foot. The limb is then placed for a few days in an immovable dressing, after which the mediotarsal joint is daily manipulated, and the limb returned to the splint. In the course of a few weeks, the varus distortion will be overcome, when the tendo Achillis is divided, through which the equinus portion of the deformity is relieved. The subsequent treatment consists in wearing the walking shoe.

There are, however, cases not only in the adult, but in older children as well, in which ordinary measures are insufficient for a cure. In such cases, cuneiform osteotomy of the tarsus more certainly overcomes the deformity than does excision of the astragalus or the cuboid bone, or of the many other operations that have been practised for that object. As shown by Lorenz, in a critical paper entitled "Die Operative Orthopädie des Klumpfusses," published in the *Wiener Klinik*, Hefte 5 and 6, 1884, the mean duration of treatment averages between six and seven weeks, and the results, so far as a useful foot is concerned, are far better than those attained by other operations. The mortality, too, is slight, since of the 91 cases which he has tabulated, only 3 died, the patient of Davy of septicaemia, that of Koeing of ulcerative endocarditis, and that of Rupprecht of diphtheria after the wound had healed, the last two being due to causes not connected with the procedure. Adding to the cases collected by Lorenz, the additional ones referred to in the discussion, by Davy, Rose, and Croft, 109 cases show only 1 death, or a mortality of less than one per cent.

#### FURTHER MEDICAL ADVERTISING.

LAST week we called attention to the indelicacy and impropriety of a physician informing the public through the newspapers of the minute details of the progress and treatment of a case, which have been gained through his confidential relations as medical attendant. Recent developments appear to show that there is no exclusive right to this kind of newspaper notoriety.

So, doubtless, thinks the inventor of an electric

osteotome, the performances of which are duly narrated in one of the issues of *The New York Tribune* of last week. We are gravely told that this is the only instrument of the kind, and that its inventor has hitherto "refrained from urging its claims on the profession until he had thoroughly demonstrated its utility," although he has "performed fifty-one distinct operations upon living subjects," with it. He, however, has not refrained from giving the public the benefit of the new instrument, and to insure its due publication "a *Tribune* reporter called upon the inventor and obtained his permission to witness the operation," in which this "new instrument" was employed. As every detail of the operation is given with technical readiness, we may suppose that the reporter had friendly professional assistance. The number of the surgeon's office in New York being given, and his official positions mentioned with suitable prominence, the public are in this way invited to entrust such cases to the great inventor of the only electric osteotome.

We look now for a sharp rivalry to obtain this kind of distinction; in which it cannot be supposed that anyone will be permitted to enjoy a monopoly. As the daily newspaper, in the eager strife for sensations, is usurping the place of the medical journal, there must be a bitter contention to procure the choicest operations for the delectation of their readers, and hence every doctor who has a new instrument to describe, a bloody operation, or a loathsome case to narrate, will have his "special" at hand, and every morning we may look in the New York dailies for highly spiced professional details, furnished by the advanced apostles of "new code" ethics.

We are not justified in assuming that in every instance a physician who appears with professional details in the secular press has been privy to the publication. The ubiquitous reporter on the quest for novelties is not deterred by such a trivial consideration as medical ethics from utilizing any startling facts; but when a physician is often before the public in "locals," the impression naturally remains that he has directly contrived the publication, or has indirectly arranged to attract repertorial curiosity.

#### THE INDEX MEDICUS.

LAST week we had the pleasure of stating that Mr. George S. Davis, of Detroit, with considerable liberality and enterprise, had undertaken to continue the publication of *The Index Medicus*, the announcement of the suspension of which, from a lack of a sufficient number of subscriptions, had been received by the profession with expressions of profound regret.

In undertaking this work, Mr. Davis incurs the

same responsibility which has resulted in an annual loss during the past six years to its former publisher, Mr. Leypoldt, but he feels that a publication which is of such inestimable value to the profession, and which is so highly appreciated by all who consult it, should not be allowed to cease, if further endeavor can make it self-supporting. In his public-spirited effort, Mr. Davis should receive the cordial encouragement and support of the profession throughout the world, for the value of *The Index Medicus* is not limited by geographical lines. We trust soon to learn that sufficient new subscriptions have been received to render its publication as permanent as it is indispensable.

#### THE ABORTIVE TREATMENT OF DIPHTHERIA.

In a brief communication to the *Berliner klin. Wochenschrift* for January 25, Dr. COESTES, of Biebrich, adds his testimony as regards the efficacy of the abortive treatment of diphtheria by calomel. He has recently treated five cases, including his own, by the administration of 15 grains of calomel, generally in three doses, closely repeated. Only one terminated fatally, and in that, the trachea was so much obstructed when he was called, that tracheotomy seemed inevitable. Succeeding the administration of calomel, however, with frictions of mercurial ointment and inhalations, the dyspnoea grew much less. Ultimately, however, the operation was performed, and the child died on the seventeenth day. The remaining cases all recovered, and Dr. Coestes justly says no one can take it amiss, if he, in consequence, has had his faith in the abortive treatment strengthened.

#### SOCIETY PROCEEDINGS.

##### NEW YORK COUNTY MEDICAL ASSOCIATION.

*Stated Meeting, March 16, 1885.*

THE PRESIDENT, CHARLES A. LEALE, M.D.,  
IN THE CHAIR.

DR. JOHN SHRADY read a paper on

#### THE ETIOLOGY OF STILLBIRTHS.

In opening, he referred to a paper read by the late Prof. George T. Elliott, before the New York State Medical Society in 1867, in which the writer, after speaking of the case of the Princess Charlotte and the subsequent suicide of Sir Richard Croft, the attendant, remarked: "There is a mournful cadence in the simple word, stillbirths, which recalls many a blighted hope, many a professional regret." Statistical tables of health departments, he said, did not shed much light on the true causes of death. In the front rank of devitalizing causes, of course, syphilis was to be placed, and it had long been recognized as an agent of fetal death, even by the oldest writers. Abortion, when this taint was present, usually took place from the fifth to the seventh

month of utero-gestation. Dr. Shradly then related several very interesting cases occurring in his own practice. In one case the mother, although under active antisyphilitic treatment all through her pregnancy, expelled a putrid seven months' fetus, and, strange to say, a very severe rupial eruption from which she was suffering, and which a gentleman well versed in dermatology pronounced incurable, entirely disappeared after the delivery. The recovery was a permanent one, and the query arose in connection with it, Was the cure coincident with the birth, or did the birth in a measure purge the maternal system?

In citing these cases, he said he desired to draw attention to the fact that the maternal system was thoroughly saturated with the syphilitic virus, and the fetal inoculation was also necessarily complete. He believed that the female was more likely than the male to transmit syphilis to progeny. Again, without claiming too much for the iodide of potassium treatment, he could not pass over with justice the query of the late Dr. E. R. Peaslee, whether the success of ultimate maternity may not be due to the gradual wearing out of the syphilization, as manifested by the occurrence of abortions at necessarily longer intervals, say the third, fourth, and fifth months. He could recall an instance in point, that of a mother, who, after twelve expulsions of foeti of various degrees of development, crowned her hopes in her forty-fifth year by the birth of a healthy boy, at present beginning his education at a primary school. Others might, perhaps, have been saved, but for her strong opposition to the induction of premature labor. In this case chlorate of potash in combination with tincture of the chloride of iron was persistently employed during the last three months of utero-gestation.

Having alluded to other maternal dyscrasias which might be discussed as factors in stillbirths, such as malarial and uræmic poisoning, the concurrence of eruptive fevers, the implication of vital organs, and the supervention of nervous shocks, he said that of all these, uræmia seemed to be the most prolific of danger to the fetus. Yet even here the latter's vitality approached the marvellous. In his own experience, in cases of scarlet fever in the lying-in chamber the child born during the inoculative state of the maternal disease, finally escaped contagion entirely. Phthisis, as being essentially a devitalizing agent to the unborn, was to be doubted. On the contrary, the generative function expanded all its energies in saving the new and jeopardized life; though the child did not usually complete its first year.

Passing from the consideration of developmental to that of local causes, he said that it was proved that metritis held a prominent place as a disturber of nutrition. How this was possible could readily be seen, since the uterine mucous membrane was to the placenta what periosteum was to bone; and when metritis was chronic in form, the ovum was not likely to retain its vitality any number of months. Malformations of the uterus, although relatively rare, are likewise mentioned, he said, as productive agents in the blight of the ovum at any stage of development, but presumably at an early date. Dislocations and flexions of the womb also opened up a field of discussion, but for the present purpose had to be dismissed with a bare mention.

In considering what he termed the more debatable portions of the subject, he referred to the diseases of the placenta; quoting from Lusk that many authors dispute the very existence of such a thing, contending that the morbid changes hitherto referred to placentitis are simply due to retrogressive metamorphoses in extravasations, while others affirm its existence, assign to it etiological relations with metritis and endometritis, and describe its pathology under the heads of congestion, hepatization, and induration and supuration. Chief among the frequently mentioned causes of stillbirths was fatty degeneration of the placenta. The term had undoubtedly been abused in the desire to offer the readiest explanation of many phenomena, or had sometimes been adopted to conceal ignorance. The question had been raised in the minds of some as to whether the fatty placenta were not a product of foetal death, and whether it was not in accordance with the general law in all retrogrades from a higher to a lower organization, as in the case of cicatrices, where the reparative method falls away from the standard of the original structure. A certain amount of fatty degeneration was present in every placenta at about the eighth month of pregnancy, and was, in some respects, analogous to the process of involution in the uterus itself. The shadowy line dividing the *post hoc* from the *propter hoc* was yet definite enough to prevent agreement among disputants. Still, Dr. Charles A. Leale, in a paper entitled "Degenerations of the Placenta," read before the New York Academy of Medicine, had adduced some very striking instances which seemed to corroborate the affirmative side of the question. Dr. E. S. McKee read before the Cincinnati Academy of Medicine, January 19, 1885, the report of a case in which a woman had ten miscarriages, the cause of which was apparently fatty degeneration of the placenta. She was found to be again pregnant, and was placed on the chlorate of potassium, fifteen grains three times a day. A healthy boy was then born at full term. Some time afterwards she again became pregnant, and was for the second time placed upon this remedy, for a time taking as high as thirty grains three times a day. The chlorate of potassium was given constantly with tincture of chloride of iron, except when such remedies as tincture of nux vomica or bismuth were demanded on account of the gastric disturbances incident upon pregnancy. A healthy boy was again born at term.

Tubercle in the placenta, claimed as an occasional cause of foetal death by some, was strenuously denied by Wilkes and Nixon. These joint authors claimed that those amorphous deposits which had done duty as tubercles were made up of altered blood. Among the other classified degenerations mentioned as causes were the calcareous, the fibrinous, and the waxy, as associated with leucocythæmia.

A certain class of cases are to be regarded as mechanical both in their origin and effect. To direct blows, falls, and the like many stillbirths had been attributed; but the number of mothers who escaped such a catastrophe was immensely large. Dr. Shradly said he was inclined to doubt the efficiency of these means in the production of stillbirths, certainly to such an extent as to qualify any direct testimony in a medico-legal examination. The mother, not always a passive agent in these matters, might have seized upon

the coincidence as opportune; so that in accordance with the mercy of the law, which allows all doubts in favor of the accused, the real criminal might escape punishment. In these instances when the death *in utero* was deferred, occurring at length as a marasmus, perhaps a gradual detachment of the placenta by reason of an intervening blood-clot acted as much as a lethal factor as the somewhat untenable placentitis. Prolapsed funes have contributed their quota towards foetal mortality; the usual history of the case being, that a gush of the amniotic fluid brought down the cord, with scarcely a warning pain, before the arrival of the medical attendant.

Thus far, he said, he had discussed the matter from the maternal side; but as the late Prof. Elliott intimated, there was a side to the question which had never claimed the attention it deserved, and that such could never be fully investigated except in the light of autopsies. The pathology of foetal life was still obscure, and yet it would probably afford a clue to many a vexed question in that department of medical science. Except when a medico-legal question was raised, autopsies upon stillborn children were exceedingly rare, on account of the objections raised on the part of the family. Yet a case of suspected infanticide was on record in England in which an autopsy exonerated the accused mother by proving the existence of a diaphragmatic hernia; the small intestines being entirely lodged in the left side of the thorax, the left lung not larger than a shilling, while a hypertrophied heart compressed the right. Such autopsies, as a rule, had revealed unlooked-for conditions. Among these he referred to effusions into the serous cavities of the thorax and abdomen, endocarditis, overdistended bladder, fatty degeneration of the entire foetus, supuration of the thymous gland, the presence of meconium in the air-passages and stomach, atelectasis pulmonum, and umbilical hernia, containing within its sac the liver and a great part of the intestines. The condition of the brain, however, explained by far the greater number of cases, as there are liable to be met with intracranial effusions and apoplectic clots of all sizes. These cases tended to throw light upon those mysterious deaths loosely attributed to eclampsia occurring during the sleep of the mother. The subject of abnormal presentations and maladjusted diameters was purposely avoided.

DR. EDWARD G. JANEWAY said that he had not much to add to what was already known in regard to the etiology of stillbirths; but there was one condition to which he believed the author of the paper had not alluded, which might be added to the group of local causes described, viz., myxomatous degeneration of the placenta.

DR. T. H. MANLEY thought that Dr. Shradly's paper was very instructive, as far as it went; but the subject was one of such vast extent that it was utterly impossible to do justice to it in the limits of a single essay. Churchill spoke of two varieties of abortion only, the accidental and the habitual. Dr. Shradly had, he supposed, claimed as accidental those cases due to constitutional disease. There was one cause of stillbirths of which he believed no mention was made in the paper, which he thought was a very frequent one in this community, and that was the influence of malaria. In



his own practice he had seen a number of cases of abortion in which patients were suffering from various forms of malaria. It was a difficult matter to treat pregnant women affected with this poison because the very drug on which we had to rely principally in malaria was itself liable to produce abortion. He then mentioned a case of such a patient who consulted him when six months advanced in utero-gestation. He placed her on small doses of quinine, and she apparently became cured. But one month afterward he was called to see her and found that she had had an extremely violent chill, followed by high fever. Moreover, she told him that the same thing had occurred for five successive days previous. He found her very feeble and directed that her body should be sponged, and that she should be given quinine in full doses. He left her quite comfortable; but when he called the next morning he found that she had been delivered of a stillborn child. During the night, labor had set in, and, as he lived at a distance, another physician had been called in. The evening after the birth of the child the mother herself died. He related another case in which a patient suffering from malaria, miscarried at the fifth month. Becoming pregnant again, however, she was treated carefully with small doses of quinine, and this time went to full term in safety. In regard to the matter of habitual abortion, if a woman miscarried the first time she became pregnant after marriage, there was always great danger of a repetition of the occurrence.

DR. WILLIAM T. WHITE said in regard to quinine as a cause of abortion that during a residence of more than eight years on the Isthmus of Panama, where, on account of the malarious climate, everybody was obliged to take quinine in large quantities, he had found that it was the practice to give it to pregnant women just as freely as to others, and he had never known of any bad effect to result. In New York also he was accustomed to using the drug freely in the case of pregnant women where it was indicated, and had never seen it produce premature delivery in a single instance. When asked by a member in what doses he employed it, Dr. White said that he sometimes gave it in doses of fifteen or twenty grains.

DR. SAMUEL T. HUBBARD related a number of cases in his practice in which syphilis had caused stillbirths. One was as follows: The disease was conveyed to the mother by nursing another woman's child at her breast. When she consulted him, she had a sore on the nipple which presented the appearances of a syphilitic ulcer, and on inquiry he found that the child which she had nursed, as well as its mother, was affected with syphilis. The patient was at once placed on vigorous antisyphilitic treatment, but, notwithstanding this, miscarried three times successively, the first time at three months, the second at five months, and the third at seven months. The treatment was continued, however, and she gave birth at term to a child, who soon died of syphilis; though ultimately she had two living and healthy children, born at full term. The husband never had syphilis.

DR. JACOB HARTMAN related the case of a stillborn child in which there was considerable deficiency in the posterior portion of the cranium, which it appeared to him from certain discharges from the uterus afterward, was due to the mechanical pressure of organized blood-clots within the womb.

DR. I. P. OBERNDORFER related the case of a woman who, having in the meanwhile had several healthy children, fifteen years after acquiring syphilis gave birth, between the sixth and seventh month of pregnancy, to a stillborn child that was the subject of a well-marked bullous syphilide.

DR. ALEXANDER BUCHANAN related the case of a woman whom he was called to attend fifteen years ago. Her husband was the subject of syphilis, and she had had seven or eight abortions between the fifth and eighth month. He placed her upon the combined treatment, and after two or three years she gave birth to a healthy child at term. She afterwards left the city and about two years ago he heard that she had died of cancer of the uterus.

DR. C. S. WOOD thought that the question of malaria and of quinine in reference to abortion should have considerable discussion, and that there should be some concert of opinion in the profession as to whether quinine was really liable to give rise to this accident or not. In view of the prevalence of malarial influences in New York, it was a matter of no little importance to decide. When during his service as an army surgeon he had been stationed in a malarious district—Sacramento, he had found that the opinion of medical men there was, that while there was no other successful way of treating malaria except with quinine, the drug ought to be given in smaller doses to pregnant women. By repeating the dose every two or three hours the same quantity could be given in the twenty-four hours, as if it was administered in one or two larger doses. In his practice in New York he has seen doses of five grains of quinine bring on threatened labor pains, which would disappear when the remedy was withdrawn, and which were not reëxcited when smaller doses were given afterward. He had never seen a single instance in which anything of the kind was brought on by quinine in small doses. There was, on the whole, much less danger of causing abortion, he thought, by the use of quinine than to allow the patient to go on suffering from the devitalizing effects of malarial poisoning. The point to which he wished especially to direct attention was how to answer the question, Is quinine given in sufficient quantities to control malaria safe in the case of pregnant women, and if not, what efficient substitute have we for it?

DR. J. R. MCGREGOR said that he had practised for a number of years in a portion of the city which had a bad reputation on account of the malaria supposed to be ripe there, but he could not say that he had ever had any reason to believe that stillbirths were remarkably frequent in the upper part of the Island. He did not hesitate to use quinine in the case of pregnant women suffering from malaria, and he had never seen any bad results from it. The drug was eliminated so rapidly from the system that it seemed to him to be of little use to give it in small doses, and he was generally in the habit of employing fifteen or twenty grains a day, divided into two doses. The danger attributed to quinine he believed to be largely a scare, and he thought its origin could largely be traced to our homœopathic brethren, who had no substitute for it.

DR. S. B. W. MCLEOD said that it seemed to him that if malaria was a recognized cause of abortion, quinine, which opposed its action, ought to be a successful preventive of abortion when malaria was present.

For his own part he never hesitated to use it freely, and so far from having met with any bad results from it, his confidence in its efficacy and safety was constantly increasing the more he employed it.

DR. JANEWAY said that he thought it would be well to call attention to the fact that a large number of stillbirths in this city resulted from a cause which had not as yet been alluded to, viz., the use of ergot by incompetent midwives. When connected with the Board of Health, he had made quite a careful investigation of this matter, and he had found that the use of ergot constituted a pretty large factor in the etiology of stillbirths in all cases attended by midwives. Another prominent factor was the fact that in difficult cases of labor the midwives usually waited too long before sending for medical assistance. These matters he considered important, in view of the fact that about one-third of all the cases of confinement in New York were attended by midwives.

THE PRESIDENT called attention to chronic obesity as a cause of stillbirths. Although the pelvic diameters might be ample, there might be such obstruction offered by the soft parts of the mother that the child could not be born alive. Several such instances had come under his observation, and in one case he had successfully delivered the patient of a living child by resorting to the induction of premature labor.

DR. SHRADY said that he had not intended to make his paper by any means an exhaustive one, and it would, perhaps, have been better to call it, "Some Points in the Etiology of Stillbirths." In regard to the matter of malaria, however, he would call Dr. Manley's attention to the fact that he had referred to it in the same part in which he spoke of uræmic poisoning. He simply mentioned it as one of the causes and did not dwell upon it, for the reason that, living as he did in a part of the city where malaria was prevalent, he might have been accused of laying too much stress on the matter. There were other causes that he might have spoken of, such as knots in the cord, the employment of instruments, careless use of the forceps, etc.; but it would have made his paper too extensive. As regards the correctness of the explanation given of the deficiency of the posterior part of the cranium in the case mentioned, he thought there might perhaps be some doubt, on account of the mobility of the fetus in utero, and also the softness of the blood-clot in the uterus.

#### EXHIBITION OF A NEW AND SIMPLE APPARATUS FOR DETERMINING THE QUANTITY OF UREA IN THE URINE.

DR. CHARLES A. DOREMUS, Professor Adjunct to the Chair of Chemistry and Toxicology in Bellevue Hospital Medical College, presented a new ureometer which he had devised. It is a glass instrument consisting of a tube bent into two arms, a longer and a shorter one, at an angle of forty-five degrees to each other. The extremity of the longer arm, on which a graduated scale is marked, is closed, while that of the shorter one, which is provided with a bulb, is left open. The long arm is filled, by inclining it, with a hypobromite solution prepared according to the formula of Knap, by dissolving 100 grammes of sodium hydrate in 250 cubic centimetres of water. By means of a nipple pipette a measured volume of the urine (1 cubic centimetre) is injected slowly up the long arm by compress-

ing the nipple. A rapid decomposition of the urea takes place, the bubbles of nitrogen rising in the long arm, while the displaced liquid flows into the bulb, which serves as a reservoir. With care the urine may be delivered at a rate that permits the decomposition to take place without loss of gas, and the graduation on the glass indicates the weight of urea in the urine used. Two forms of the apparatus were made, Dr. Doremus said: one graduated to real fractions of a gramme, the other to show grains of urea in the fluidounce of urine. The instruments were supplied by Messrs. Eisner and Amend, of Third Avenue and Eighteenth St., New York.

DR. A. FLINT, JR., said that he was glad to be able to make some remarks on the beautiful demonstration made by Prof. Doremus. It was a thing to rejoice in whenever any addition was made to the simple methods in our possession of obtaining important results, and he thought that no more important matter could be brought to the attention of the busy practitioner than such a one for determining the quantity of urea as Prof. Doremus had just presented to the Association. If looked at from a practical point, excessive accuracy in this procedure was not a matter of importance. It was useless, and worse than useless, to attempt to secure excessive accuracy in such manipulations. The important points which the practitioner usually required to know in regard to the urine of his patient were very few, and, thanks to the present achievement of Dr. Doremus, very simple means were now at his command for obtaining them all. In the first place, a ready test for sugar was afforded by the two solutions of Dr. Squibb. The method was absolutely perfect, and by means of it the absence of sugar, which was always a more delicate matter to determine than its presence, could be positively demonstrated. In the second place, no better tests for the detection of albumen were required than the cold nitric acid test, conjoined with heat, if care was taken to have the urine under proper conditions when making the examination. In this connection he mentioned an interesting case which had come under his observation as a life insurance examiner. There was some question as to whether there was albumen in the urine or not, and on the application of heat there was a slight, but distinct, precipitate. This was undoubtedly caused by phosphates, for when nitric acid was added it cleared up; but there then followed a slight precipitate which was due to albumen. With the cold nitric acid test there was, after the urine had been set aside for two or three minutes, the characteristic white zone between the nitric acid and the urine floating above it. In the third place, the question of the amount of urea arose. The practitioner wanted to know how much urea there was in the urine of his patient, so that he could judge whether the kidneys were doing their work properly in throwing off a sufficient quantity of excrementitious products. He had long felt the want of some easy way of determining this, and the apparatus which had just been exhibited seemed to him to meet the case precisely. He, therefore, regarded it as one of the most important contributions which had been presented to the profession on the subject. In conclusion, he said he should like to ask Dr. Doremus whether it was essential that the soda of the alkaline solution should be exactly in the proportion of six ounces to the pint of water.

DR. DOREMUS replied that the caustic soda solution should always be in excess. The quantity of the alkali might be greater than this; but it was never to be below it. In regard to the quantity of bromine great accuracy was not necessary. The determination of the amount of urea, it was to be remembered, was only approximated by this method.

DR. E. G. JANEWAY then presented two specimens which he said he thought would be of interest. The first one, which illustrated a point in doubt, was a case of

#### PERFORATING ULCER OF THE OESOPHAGUS.

It occurred in a child who, at the age of one year, was attacked with infantile paralysis, and who afterwards died of dysentery. The ulcer, which was round, and half an inch in diameter, was situated about one inch above the entrance of the oesophagus into the stomach, and not in the posterior wall, but the left lateral wall. The point of interest in connection with the case was the fact that the existence of such a peptic ulcer of the oesophagus before death had been denied; and in his recent work on diseases of the throat and nose, including those of the oesophagus, Morell Mackenzie stated that a case of his own which he had reported some time ago as "simple ulcer of the oesophagus," as well as one of Dr. Benson, was too incomplete to be relied on. Mackenzie thought they were open to the objection that the disease may have been of malignant nature, the ulcerated surface not having been submitted to the test of microscopic examination. This, however, he believed was a case of true peptic ulcer, such as was met with in the stomach, and due to the action of the gastric juice upon the mucous membrane. It was a difficult thing to prove just what changes occurred before death, and which were post mortem in a case of this kind; but the ulcer here in the oesophagus presented precisely the same appearances as those found in the stomach, which were acknowledged by all to give rise to perforation, peritonitis, and death. In the present instance there was inflammation not only of the connective tissue surrounding the oesophagus, but also of the pericardium and left pleura. Again, the odor of the parts was entirely different from the sour odor characteristic of post-mortem gastric digestion. During life, however, so far as could be ascertained, the child presented no signs of pericarditis, pleurisy, or perforating ulcer of the oesophagus.

#### SUDDEN DEATH IN A CASE OF TRACHEAL STENOSIS.

The other specimen, Dr. Janeway said, was from a case illustrating a rare method of sudden death. It was that of a child who had a mass of enlarged glands on the right side of the trachea, giving rise to tracheal stenosis, and died very suddenly from asphyxia. At the autopsy a cheesy gland was found at the bifurcation of the trachea, which had produced ulceration, while occluding the stenosed passage was a white mass which had undoubtedly become detached from this, but which was at first mistaken for coagulated milk. In addition, there was a fibroid induration of the upper lobe of the right lung, and a thickening around the bronchi. In connection with this case, Dr. Janeway remarked that this bronchial and tracheal stenosis was no uncommon thing, and that we should therefore be on the watch for

it. Two physicians had expressed the opinion that this child had died of paralysis of the heart; but paralysis of the heart, like the term malaria, was often used merely as a convenient expression to conceal ignorance. What was believed to be paralysis could only be determined by an autopsy. When stridor was heard in connection with tracheal breathing it should always attract attention to the glands of the part. It was a fact, Dr. Janeway said in conclusion, that in childhood we could have the whole course of tuberculosis gone through with without any elevation of temperature whatever.

THE PRESIDENT said that he had known of a case of sudden death in connection with enlargement of the thymus gland.

#### RHODE ISLAND MEDICAL SOCIETY.

*Quarterly Meeting, held at Providence, March 19, 1885.*

THE PRESIDENT, OLIVER C. WIGGIN, M.D.,  
IN THE CHAIR.

THE CHAIR presented a communication from the American Association of Superintendents of Asylums for the Insane, asking the approval and coöperation of the different State medical societies in a proposed petition to the President and Congress of the United States for the enactment of laws to prevent the

IMMIGRATION OF THE SO-CALLED DEFECTIVE CLASSES of foreigners,—hoping thereby to check the alarming increase of insanity in this country.

The Society voted its approval of the proposed enactments, etc.

DR. ROBERT F. NOYES, of Providence, read a paper upon

#### ENTERIC FEVER OCCURRING IN PREGNANCY,

embracing a report of the following case:

Mrs. X., aged twenty years, between three and four months advanced in her first pregnancy, and thirteen days sick with typhoid fever, was admitted to the Rhode Island Hospital, August 19, 1883, with a temperature of 104.2°, and a pulse of 132. She was put in a private room of the hospital, and treatment by carboloid acid and tincture of iodine, with nourishment, stimulants, and sponging instituted. The next day, the fourteenth of the disease, the evening temperature was 104.8°; pulse 120.

Fifteenth day, evening temperature 104.3°; pulse 120.

Sixteenth day, evening temperature 104°; pulse 138. On this day uterine hemorrhage occurred, which threatened to be profuse, but was controlled by position and the use of ice, after which the vagina was tamponed. At this time the patient became delirious.

Seventeenth day, temperature 104.8°; pulse 140. During the day labor pains began, the tampon was removed, and at 8.15 P. M. delivery of the fœtus and placenta was accomplished, with very slight hemorrhage; the uterus contracting well. A warm, carbolized, vaginal douche was given, and the supporting and stimulating treatment continued. During the night the patient failed rapidly, her pulse became very rapid, and at times was imperceptible at the wrist. The stethoscope showed the pulse-rate to be 168 per minute. Syncope occurred several times, which was promptly treated by removing



the pillows, elevating the foot of the bed, and brandy hypodermically.

Eighteenth day, temperature 104.4°; pulse 130. Still delirious. The carboic acid and iodine were discontinued, and milk and brandy only were given by the rectum.

Nineteenth day, morning temperature 105.5°; pulse 144. Delirium, carphologia, subsultus tendinum, tympanites, and tracheal râles, which last-named continued for seventy-two hours, during which time the patient was nearly unconscious. As much milk and brandy were given by mouth and rectum as was possible, together with brandy hypodermically, and opium by suppositories. Quin. sulph., grs. xl, was also given per rectum once in six hours. The tympanites was relieved somewhat by a turpentine enema, and stupes of the same on the abdomen.

Twentieth day, morning temperature 105.5°; pulse 144. Evening temperature 103.8°; pulse 140. Same treatment continued.

Twenty-first day, morning temperature 104.2°; pulse 140. Evening temperature 103°; pulse 140.

Patient sank gradually during the day. Brandy almost constantly by the mouth. Active delirium continued till midnight, when a suppository of sulph. morph., gr. ss, was given, which greatly relieved the symptoms.

Twenty-second day, morning temperature 105.2°; pulse 140. Evening temperature 102.4°; pulse 140. Condition unchanged. Same treatment.

Twenty-third day, morning temperature 104°; pulse 135. Evening temperature 102.5°; pulse 130. Condition slightly improved.

Twenty-fourth day, morning temperature 103°; pulse 138. Evening temperature 101°; pulse 138.

Tincture of digitalis, in moderate doses, was now added to the treatment.

From the twenty-fifth day, when the temperature was 99.4°, pulse 127, to November 15th, when Mrs. X. was discharged from the hospital *well*, there was a continuous but slow convalescence. Despite all precautions, a large sacral bed sore had developed, which went through its stages of sloughing, granulation, and complete cicatrization.

Dr. Noyes then quoted many authors who teach that abortion is to be expected in the vast majority of cases of enteric fever occurring in pregnancy, and gave the following opinions as to the cause of the miscarriage:

Schröder believes that it is due to the death of the child in the uterus from excessive accumulation of heat.

Kaniesky says that a maternal temperature above 104° F. is very dangerous to the child, and Schweden coincides in this opinion; while another author considers the uterine hemorrhage which is prone to occur in typhoid fever, to be the cause of the abortion.

Returning to the case reported, Dr. Noyes remarked that his patient had a very rapid pulse. For twenty-one days it was seldom less than 130, and for seven days it was about 140, and upon one occasion it rose to 168. The delirium also was continuous for two weeks, while the temperature for eleven days was seldom below 104° F.,—the morning temperature upon three occasions going above 105°. Now, a pulse of 130, for any considerable time, with a high temperature and continuous delirium, renders the prognosis in typhoid fever very unfavorable.

Authors were again quoted as follows: Liebermeister observed 26 patients whose pulse rose above 140, and 21 of whom died. In 12 of these cases the pulse rose above 150, and of this number 11 were fatal.

Wunderlich states that death is almost certain after a morning temperature of 105.8°, and is sure to follow a morning temperature of 106.25°.

All the cases noted by Fiedler in which the morning temperature rose to 106.25°, proved fatal.

DR. MANN, of Central Falls, reported one case of typhoid fever, the patient being five months pregnant. She aborted and recovered.

DR. HUNT mentioned two cases one of which was fatal. In the other, the fever was very severe, but the woman recovered without aborting.

DR. G. C. WIGGIN said he had seen three of this class of cases in his practice. Two were mild, and the patients recovered, and went on to delivery at full term. In the third case the woman was delivered of a living child on the twelfth day of the fever without being conscious of her labor nor did she know that she had been delivered until several days afterwards. The child lived, and the mother recovered.

DR. BRIGGS mentioned a case in which the fever ran high for three weeks, the temperature reaching 105° daily for six days. The fever subsided. Then there was a relapse with another week of fever. Labor then came on at the eighth month, and a living child was born, greatly emaciated, but it lived twelve days. The mother recovered.

DR. A. BALLOU could recall only two instances of enteric fever during pregnancy out of the four thousand confinements he had attended.

DR. WHITE spoke of a case that occurred at the Rhode Island Hospital. The woman was about five months pregnant, and the fever had been running several weeks, the patient seeming to have very little consciousness the greater part of the time. Suddenly a terrific intestinal hemorrhage occurred, saturating the bed and forming a large pool on the floor of the room. When the house physician, who was hastily called by the nurse, entered the room, he found the patient lying on the floor, dead. There had been no signs of abortion in the case. The child was thought to have died early in the course of the fever.

DR. WIGGIN remarked, on the general subject of typhoid fever, that he thought it was greatly to a patient's disadvantage to be moved after once prostrated by the disease, and that if he were to find himself down with typhoid fever, and in a barn, he would rather remain there and take his chances than be transported to a hospital or any other place.

DR. GEORGE W. PORTER of Providence, then read his

#### REPORT OF A CASE OF PYOSALPINX.

Mrs. T., aged twenty-seven years, was never very strong. She menstruated first when sixteen or seventeen years old, but was never regular, the intervals being from six to eight weeks. She has been married six years, but has had no children. Has always had dysmenorrhœa, the pain being in her back, and across the lower part of the abdomen. For the last three years there has been a "burning pain" in both hips most of the time, intermittent, and coming on chiefly at night.

Five years ago she jumped several times from a

wagon body down to the ground, and at once began to have painful micturition which has been persistent ever since. She was unable to work for a year. She was first seen by Dr. Porter last October, who found slight retroversion of the uterus, and some thickening of the utero-sacral ligaments, resulting from old inflammation, for which she was treated for a short time.

Early in November, 1884, a pessary was placed, which was followed by cellulitis. In January last she began to notice pain in the left side, referred to the hip, and different from that previously experienced in the hips. It was attended by nocturnal exacerbations, but no chills. Soon after the right ovary was found to be prolapsed, and a mass existed on the left side of the uterus, which was very sensitive, and which increased rapidly in size, assuming the sausage-shape of a dilated and bent Fallopian tube.

Operation, February 14: An incision two inches long was made in the median line of the abdomen just above the pubes. Two fingers were inserted, and the left Fallopian tube drawn up. Some slight adhesions, holding the uterus and tube backwards, were broken up. As the ovary could not be found, the incision was slightly enlarged which revealed the ovary completely encircled by the distended tube which was everywhere very firmly adherent to the ovary.

A double ligature was passed through the broad ligament and tied firmly, on one side close to the horn of the uterus, and on the other, embracing the outer portion of the broad ligament. The tube and ovary were then cut away. A little pus escaped at the uterine end of the tube, but it was carefully kept from the peritoneum. There was no loss of blood except a slight oozing from the breaking up of the adhesions. The other ovary, slightly enlarged, was felt, prolapsed into Douglas's pouch. The right tube was not distended, and with its ovary was left undisturbed. The pelvis was carefully sponged out, and the abdominal wound closed by silver sutures, so placed as to bring into contact a considerable portion of peritoneum, on each side of the line of incision. The abdomen was covered with a thick layer of salicylated cotton, and firmly strapped with adhesive plaster. The spray was not used, but the hands, instruments, etc., were thoroughly carbolized. No apparent shock followed the operation. Menstruation, not due for six days, came on the second day after the operation, and continued five days. There was some pain on the right side, but none on the left. The catheter was used for a week. On the morning of the third day and on the evening of the fourth, the temperature was 100.2°, but at no other time did it exceed 100°. The pulse did not reach 100°. The wound healed by first intention. Some of the sutures were removed on the eighth day, but the deeper ones not so early, the last one remaining for two weeks. The patient returned to her home in three and a half weeks, with an excellent appetite, and gaining strength daily. The operator's only regret was that he did not remove the right ovary also.

DR. B. R. LYMONDS read a paper on

#### RACHITIS.

The characteristic symptoms of the disease were said to be profuse sweats; a desire on the part of patients to be cool at night, causing them to throw off the bed

clothes, etc.; a general hyperæsthesia of the entire surface of the body; intestinal and bronchial catarrh; febrile movements; and a soft, blowing sound, synchronous with the first sound of the heart, heard over the anterior fontanelle if still enclosed. The etiology, anatomical changes, and treatment of the disease were given in detail.

#### DELEGATES TO THE NEXT MEETING OF THE AMERICAN MEDICAL ASSOCIATION

were elected as follows: Drs. H. Canfield, J. W. Sawyer, O. C. Wiggin, A. G. Browning, G. H. Eldredge, F. B. Fuller, Benjamin Greene, A. Ballou, George Kenyon, Job Kenyon, H. G. Miller, Charles O'Leary, G. A. Pierce, Anita E. Tyng, of Philadelphia, H. Terry, S. Hunt, W. E. Anthony, and W. J. Burge.

DR. E. B. SMITH reported a case of

#### CANCER OF THE INTESTINE.

The patient was a woman 44 years old, who had led a sedentary life and suffered from constipation, and attacks of intestinal colic. Toward the close of life the stomach became very irritable, and the abdomen so enormously distended by gas that the colon was punctured every other day by a fine aspirator needle. Cancer of the sigmoid flexure was diagnosed. The intestine became wholly occupied by the disease, so that no alvine defection occurred after November 30th, death, however, not occurring until the 12th of the following January. The autopsy revealed a hard, cancerous mass filling the region of the sigmoid flexure, and extending into the pelvic cavity five or six inches.

DR. J. S. HUNT reported a

FATAL CASE OF EMBOLISM OF THE PULMONARY ARTERY occurring the *thirty-ninth* day after confinement. The patient had had phlebitis with considerable tenderness in the left groin. The heart, on post-mortem examination, was found to be empty, and death was thought to have been caused by syncope

#### NEW YORK SURGICAL SOCIETY.

*Stated Meeting, March 10, 1885.*

THE PRESIDENT, ROBERT F. WEIR, M.D.,  
IN THE CHAIR.

#### CARCINOMA OF THE TONGUE.

DR. H. P. SANDS presented a man to show the result of an operation performed three weeks ago for carcinoma of the tongue. The patient was fifty-eight years of age, formerly a colonel in the English army, of excellent constitution and in robust health until six years ago, when he fell, and soon afterwards developed symptoms of spinal trouble, supposed to be locomotor ataxia. These consisted of shooting pains in the limbs, difficulty in passing urine, and visual disturbances. Four years ago the patient, who had long been an immoderate smoker, noticed a crack on the left side of the tongue, near the tip, which afterward developed into an ulcer two years ago; the ulcer began to extend rapidly, and some local applications were made without arresting the progress of the disease. When Dr. Sands first saw the patient, about a month ago, in consultation with Dr. R. A. Caldwell, of this city, there was well-marked cancerous ulceration of the left side of the tongue. The disease ex-

tended from a point about three-quarters of an inch behind the tip to within an inch of the epiglottis. The ulceration did not extend beyond the median line, but hardened tissue could be felt beneath the surface on the right side. There was no enlargement of the submaxillary lymphatic glands. The man's general health seemed to be good, and as he suffered from severe pain, profuse salivation, and difficulty in articulation and mastication, he was desirous that an operation should be performed. The result was very gratifying, and showed how quickly patients sometimes recovered from an operation usually regarded as formidable. The procedure followed in this case was one which Dr. Sands believed to be best. When the disease is confined to the tongue both lingual arteries were tied, as a preliminary step; the tongue was then seized with a volsellum forceps, and removed with a scissors as far back as the epiglottis. The preliminary ligatures were applied to the lingual arteries in the usual way in the digastric triangle. On the left side a branch of the lingual artery was also tied,—probably the dorsalis linguae. The effect of tying these vessels was to render the operation nearly bloodless, so far as the tongue itself was concerned. There was a little bleeding from small vessels at the floor of the mouth. But all oozing was pretty well checked by pressure within a short time after the operation. Iodoform gauze (Wölfler's), containing a little resin, to make it adhere to the surface, was applied to the surface of the wounds in the mouth. The wounds made for ligation of the lingual arteries were sutured, except where a soluble drainage-tube was inserted, and healed by first intention. The patient was nourished by enemata during the first twenty-four hours, and was afterward fed through a stomach-tube introduced three times a day for a week. The mouth was first irrigated every two hours during the day with a solution of permanganate of potassium, half a drachm to a quart. The temperature at no time rose above 99° F., and at the end of a week the external wounds were firmly united, and convalescence was established. At the present time, three weeks after the operation, the wound in the mouth was almost completely healed, the remaining granulating surface not exceeding half an inch in diameter. The patient, entirely relieved of pain and salivation, was able to swallow with ease, and, notwithstanding the loss of his tongue, could be understood in conversation.

#### RADICAL CURE OF A LARGE CONGENITAL OMENTAL HERNIA BY EXTIRPATION.

THE PRESIDENT presented a man, aged thirty-three, from whom he had removed, in May last, a mass of omentum weighing a pound and a half, which occupied the left side of the scrotum. The tumor had existed from early infancy, and its development had given rise to but little inconvenience. Its size, however, subjected the patient greatly to annoyance and mortification. Several years since an epididymitis of a urethral trouble occurred. With this a considerable acute hydrocele developed, and as it was then thought that the hernia was of the usual variety, and separate from the cavity of the tunica vaginalis, the scrotum was punctured and the fluid withdrawn. The relief was marked, and no reaction followed the operation; but it was evident, during the removal of the hernial mass last spring, that the trocar had invaded the sac of the congenital hernia at the operation under spray. In May the ordi-

nary longitudinal incision was made; the omental mass was tied off in two sections close up to the internal ring. One of the ligatures, partially slipping, threatened considerable hemorrhage; but this was obviated by a firm grasp with the forceps and another ligature. After careful dissection from the cord, the peritoneal prolongation was tied *en masse* and divided, a drainage-tube inserted, the wound closed, and sublimate dressings applied. The patient was about ten days after the operation, and had no subsequent trouble. As a precautionary measure, demanded by the companies in which he was insured, he for a time wore a truss, which has now for some time been abandoned. There is no disposition to fresh protrusion, and the parts are solidly closed. The hernial mass was the largest which Dr. Weir had any knowledge of being removed in this manner.

DR. HALSTED then read a paper entitled,

#### THE DESCENT OF FEMORAL HERNIA,

which will appear in full in a subsequent number of THE MEDICAL NEWS.

### NEWS ITEMS.

THE ROYAL MEDICAL AND CHIRURGICAL SOCIETY OF LONDON held its annual meeting on March 2d, and a very satisfactory balance-sheet was presented. The annual report showed a larger number of Fellows than in any previous year, namely, 741; and a larger number of attendances at the meetings of the Society. A larger proportion also of those who had attended had taken part in the discussion, namely, 145 out of 632. The library also had increased by 520 volumes, and 3421 books had been lent during the year.—*British Medical Journal*, March 7, 1885.

THE CARTWRIGHT PRIZE.—Essays in competition for the Cartwright Prize must be handed in to some member of the Committee on or before April 1, 1885.

The Committee consists of Robert Abbe, M.D., 32 East 20th Street; Walter Mendelson M.D., 209 West 46th Street; and R. W. Amidon, M.D., Chairman, 18 West 21st Street.

LOUISVILLE MEDICAL COLLEGE.—The Annual Commencement of the Louisville Medical College was held February 26. Sixty-three graduates received the degree of M.D.

PROFESSOR KARL BARDLEBEN, of Jena, has been unanimously chosen editor of *Die Zeitschrift für Medicin und Naturwissenschaften*, the organ of the Medico-Scientific Society.

#### OFFICIAL LIST OF CHANGES OF STATIONS AND DUTIES OF MEDICAL OFFICERS OF THE UNITED STATES MARINE-HOSPITAL SERVICE, FOR THE WEEK ENDING MARCH 21, 1885.

SAWTELLE, H. W., *Surgeon*.—Detailed as Chairman of Board for physical examination of officer of the Revenue Marine Service, March 17, 1885.

ARMSTRONG, S. T., *Passed Assistant Surgeon*.—Granted leave of absence for thirty days, March 16, 1885.

AMES, R. P. M., *Passed Assistant Surgeon*.—Detailed as Recorder of Board for physical examination of officer of the Revenue Marine Service, March 17, 1885.